INTERSHAKE

Test System

Volume II

ATLANTIC RESEARCH CORPORATION

QUICK BROWN FOX

STEP	DATA	FUNCTION
00	01	60
01	00	98
02	00	00

BIT RATE 2.4K

STOP BIT 2

INFO BIT 8

PARITY NONE

ON LINE MONITOR → TERM

EIA CONTROL OFF

MONITOR

TEST MODEM DCE

OM 860B

PART 1

Price $50.00

IMPORTANT NOTE!

Part 1 of this manual covers the INTERVIEW and INTERVIEW II CRT Data Displays as they are used with the INTERSHAKE series of test instruments.

Refer to Part 2 of this manual for stand-alone operation of the INTERVIEW II as a CRT Data Display and Monitor.

OPERATOR'S MANUAL

INTERVIEW ™ CRT

DTM OPTIONS 18-5 THROUGH 18-8

and

INTERVIEW II ™

CRT

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Manufactured by:

ATLANTIC RESEARCH CORPORATION
Teleproducts Division
5390 Cherokee Avenue
Alexandria, Virginia 22314

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FOREWORD

This Operator's Manual is published in two parts as follows:

PART 1

Part 1 covers the operation of *both* the *INTERVIEW* and *INTERVIEW II* CRT Data Displays, and the application of these instruments as visual data displays when used with the *INTERSHAKE* series of data communications test equipment.

PART 2

Part 2 covers the operation of *only* the INTERVIEW II, and the application of this instrument as a stand-alone data display and monitor.

PART 1

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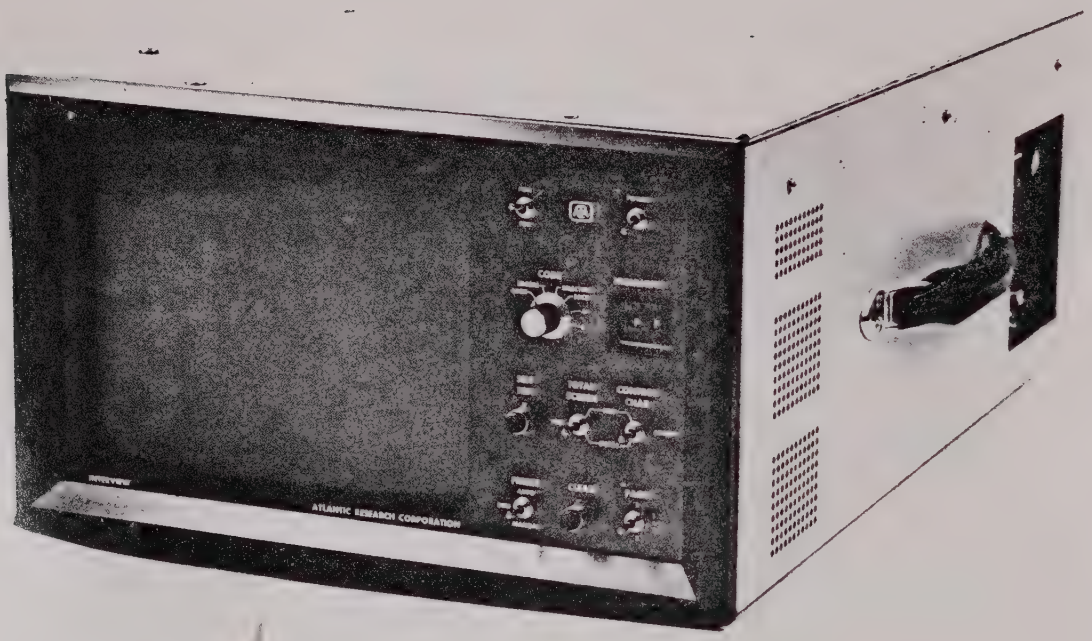
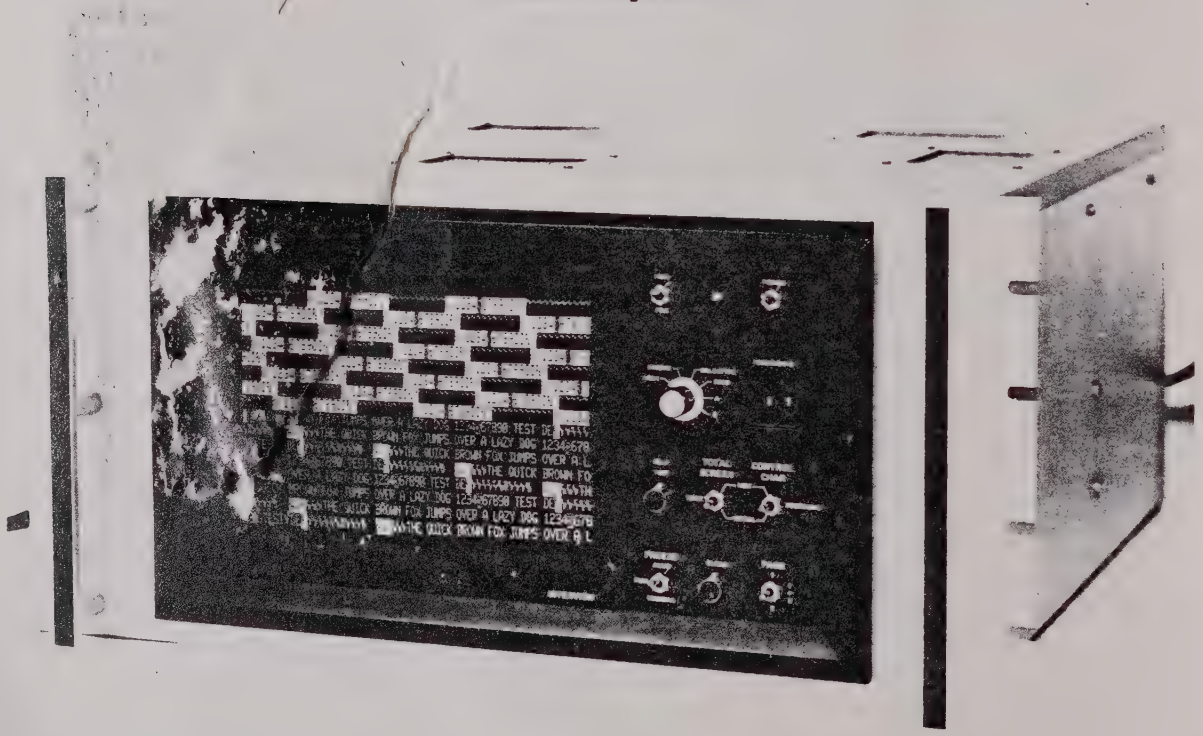


a. Portable Configuration



b. Rack-Mount Configuration

Figure 1-1. INTERVIEW CRT Display.

Figure 1-2. INTERVIEW II CRT Display
(Portable Configuration).

SECTION 1

GENERAL INFORMATION

1.1 INTRODUCTION

The information in this manual covers the general description, operation, and application of the INTERVIEW™ and INTERVIEW II™ CRT Data Displays, and describes the use of these instruments as peripheral visual displays used with the INTERSHAKE® series of data communications test instruments.

For purposes of explanation, both the INTERVIEW and INTERVIEW II are referred to herein as INTERVIEW when discussions apply to both instruments

The INTERVIEW CRT Data Displays are shown in Figures 1-1 and 1-2.

1.2 PURPOSE AND USE OF EQUIPMENT

The INTERVIEW is a CRT data display, designed to be used as a peripheral instrument with the INTERSHAKE series of data communications test equipment.

The INTERVIEW permits test personnel to view test data as it is transmitted, received, monitored, or reviewed by the INTERSHAKE systems test equipment.

The unit operates with synchronous or asynchronous data format in full-duplex (FDX) or half-duplex (HDX) systems, and is compatible with any of six selectable data codes, including:

- ASCII
- EBCDIC
- SELECTRIC
- EBCD
- A
- B

(A and B: Customer Specified)

The INTERVIEW is capable of displaying data in any of three characteristic styles (fonts), as follows:

- CLEAR TEXT: Upper/Lower Case Alpha-Numeric, 128-Character ANSI, plus two-character abbreviations, (e.g., control characters S_Y, E_T, A_K). See Figure 2-2.
- HEXADECIMAL: Two-Digit Alpha-Numeric, 256-Character total, (00-FF). See Figure 2.3.
- OCTAL: Three-Digit; One dot column vertical array plus two column alpha-numeric, 256-Character total, (000-377). See Figures 2.3 and 2.4.

Test data applied to the INTERVIEW is stored as it is received in a "CRT Refresh Display" memory. The data is then decoded and translated to the desired display font at the time of display. In this manner, it is

possible to store test data for future manual analysis. For example, a quantity of test data may be entered in the Refresh Display memory and "frozen". In this state, no new data may be entered into the Refresh Display memory, and the entered data can be displayed indefinitely. While the data is displayed, the operator may decode it in any of the selectable codes to determine the original coding scheme.

In addition to the decoding capabilities and display fonts provided by the INTERVIEW, the equipment is capable of producing a wide variety of display enhancements and other features, under control of the INTERSHAKE instrument. These display enhancements are used to highlight critical or pertinent data to attract immediate operator attention.

1.3 FUNCTIONAL DESCRIPTION

1.3.1 General Operation

The INTERVIEW is a peripheral CRT data display, designed specifically to be used with the INTERSHAKE series of test instruments. In the normal operating configuration, the INTERVIEW is connected to the INTERSHAKE through the AUX INTERFACE connector of the INTERSHAKE instrument. All data and display control signals are applied to the INTERVIEW through this interconnecting cable.

Control of the INTERVIEW display is accomplished both by commands supplied from the INTERSHAKE (through test program control functions) and by the front panel controls on the INTERVIEW. A complete description of display control, and control functions, is included in Section II (Operation) of this manual.

1.3.2 Operating Speed

Operating speed of the INTERVIEW is determined by the clock signal used in the system under test, or the data rate of the test signal. Display writing speed of the INTERVIEW can be maintained at a maximum system data rate of 62 KBPS Full-Duplex (FDX).

Clock breathing, common to FDX circuits, causes the "slower" channel to display a "fill" symbol periodically to maintain correct time correlation between the two circuits. In order to maintain a steady display, data bits applied to the INTERVIEW are first stored, and then written into the CRT memory only during sweep retrace time, which eliminates display flicker. The process of data entry into memory only during retrace imposes the maximum operating speed.

1.3.3 Display Characteristics

The INTERVIEW employs a 9-inch (diagonal) CRT to produce an image area of approximately five inches by seven inches. The basic display provides:

1024 CHARACTERS – 16 Lines of 64 Characters (Two Pages)
512 CHARACTERS – 16 Lines of 32 Characters (One Page)

This dual-page feature, when used under program control of the INTERSHAKE, permits two separate data blocks to be displayed in either a composite or comparative manner.

When Full-Duplex data is displayed with the dual-page feature, a four-quadrant comparison can be achieved, where the screen is divided into four quadrants. The top two quadrants represent Page 1, and the bottom two quadrants represent Page 2. The two left quadrants represent Transmit Data, and the right two quadrants represent Receive Data (see Figure 1-3).

As data is written onto the screen, the character sequence starts at the top of the screen at the left, and advances from left to right, top to bottom, until the display is complete. When the display is filled, the character sequence starts at the top left of the screen and rewrites the display. As each new line is started at the left of the CRT, the complete line displayed previously is blanked to present a clear indication of new data being displayed.

When the AUTO FREEZE is employed, the oldest character blinks rapidly, and is located in the *home* position (upper left corner). The display freezes only after a complete page is written.

When the MANUAL FREEZE is employed, the oldest character blinks rapidly, and is located immediately after the last character written. The display freezes immediately when the switch is depressed, and the remainder of a line being written is unblanked to show the remaining contents of that line.

Other display characteristics include program-controlled character enhancements, undefined character enhancements, and program-controlled font selection of test and/or control characters. These display features are described in detail in Section 2 (Operation) of this manual.

1.4 PHYSICAL DESCRIPTION

The INTERVIEW is manufactured in both portable and rack-mounted configurations. Both models are functionally identical, but differ physically as outlined in the following paragraphs.

1.4.1 Portable INTERVIEW

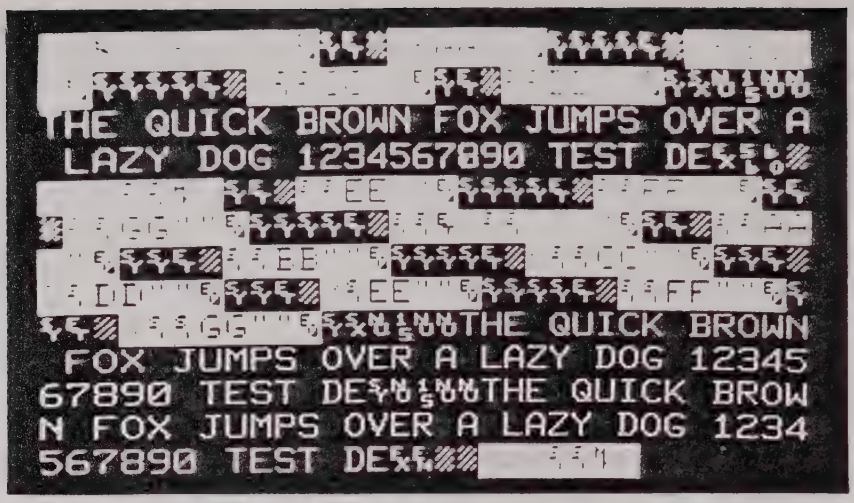
The portable INTERVIEW is shown in Figure 1-1a. Rails on the unit permit horizontal use on a bench or desk; or the unit may be positioned vertically (on the floor), with front panel facing upward. The unit measures 8.5 inches (20.6 cm) high, 14 inches (35.6 cm) wide, and 21.5 inches (54.6 cm) deep and weighs approximately 34 pounds (15.5 Kg).

A compartment on top of the unit houses the power cord and interconnecting test cables. A panel on the side of the unit provides access to the test cable connector (AUX INTERFACE), power connector, video output connector, fuse, and input voltage (115/230) selector switch. On the INTERVIEW II, the top compartment also houses the Data Format controls, which are used *only* in stand-alone operation. (See Part 2 of this manual.)

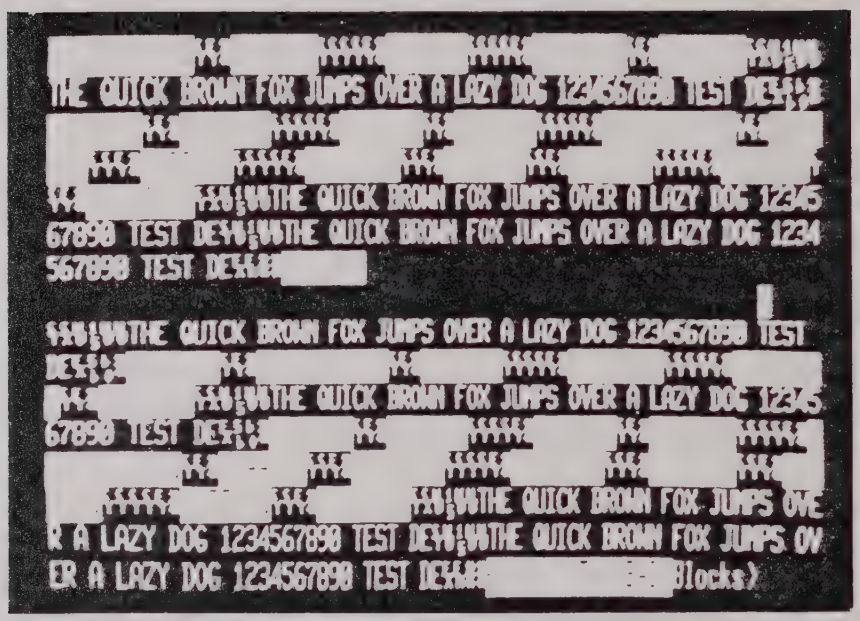
1.4.2 Rack-Mounted INTERVIEW

The rack-mounted INTERVIEW is shown in Figure 1-1b. The unit is designed to be mounted in a standard 19-inch equipment cabinet. Provisions are made on the rear of the chassis for all power, signal and interface connections. The front panel is 8.75 inches (22.2 cm) high by 19.0 inches (48.3 cm) wide. The unit is 20.0 inches (50.8 cm) deep and weighs approximately 34 pounds (15.5 Kg).

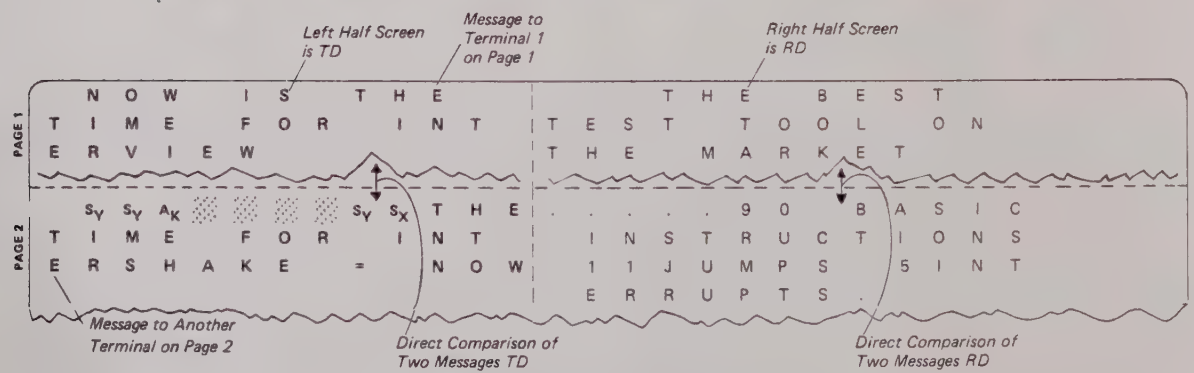
The auxiliary control panel used in the rack-mounted INTERVIEW II (see Figure 1-2) is designed for standard 19-inch rack mounting, and requires 3.5 inches of vertical rack space. The control panel weighs 9.5 pounds.



a. 512-Character Display (Page 1)



b. 1024-Character Display (Page 1 + Page 2)



c. Full-Duplex Four-Quadrant Display

Figure 1-3. INTERVIEW Display Modes.

1.4.3 Factory Settings

Internal adjustments, such as Brightness, Contrast, Horizontal and Vertical Size, Linearity, etc. have been set at the factory to provide an optimum display. These internal controls should be set by qualified service personnel.

1.4.4 Optional Code Translation

In a standard configuration, the INTERVIEW is supplied with the four following code translation capabilities:

- ASCII
- EBCDIC
- SELECTRIC
- EBCD

These codes are listed on the front panel at the CODE Selector switch. Two additional positions of the CODE Selector switch (A and B) provide for translation of two optional codes, as specified by the user. These two additional codes are available in the five following combinations:

Option 1:	A	BCD	Option 4:	A	BAUDOT
	B	REV BCD		B	REV BCD
Option 2:	A	BCD	Option 5:	A	BAUDOT
	B	REV EBCD		B	IPARS
Option 3:	A	BAUDOT 1			
	B	FIELD DATA			

These options are normally installed at the factory to meet the requirements of the user. (Refer to Appendix A for field installation instructions.)

NOTE

REV CODES HAVE HIGH ORDER BIT (Most Significant Bit) TRANSMITTED FIRST.

1.5 QUICK REFERENCE SPECIFICATIONS

1.5.1 Size

Portable INTERVIEW	—	8.5" X 14" X 21.5" (20.6 cm X 35.6 cm X 54.6 cm)
Rack-Mount INTERVIEW	—	8.75" X 19" 20.0" (22.2 cm X 48.3 cm X 50.8 cm)
Interview II Rack-Mount Control Panel	—	3.5" X 19" X 13" (9 cm X 48.3 cm X 33 cm)

1.5.2 Weight

Approximately 34 pounds (15.5 Kg).
Control Panel (For Rack-Mount): 9.5 pounds (4.3 Kg)

1.5.3 Power Requirements

115/230V AC, external switch selected. 50/60 Hz, internal setting. Rotate header assembly shown in Figure A-2 180° for selection. Header is shown in 60 Hz position. 110 watts maximum.

1.5.4 Input Signal Requirements

Supplied by INTERSHAKE through AUX INTERFACE Connector.

1.5.5 Video Output

Composite, 2 volts P/P, Negative sync, BNC Connector.

1.5.6 Display Area

Approximately 5" X 7" aspect ratio; 9-inch diagonal CRT.

1.5.7 Data Codes

ASCII	SELECTRIC
EBCDIC	(A) CUSTOMER SPECIFIED
EBCD	(B) CUSTOMER SPECIFIED

1.5.8 Display Characters

128-Character ANSI
256-Character HEXADECIMAL
256-Character OCTAL

1.5.9 Display Capacity

1-Page (16 Lines, 32 Characters)
2-Page (16 Lines, 64 Characters)

1.5.10 Display Enhancements

Character Reverse Image
Character Blink
Character Low Intensity
Reverse Image/Blink

1.5.11 Display Speed

Accepts Full Duplex data at data rates up to 62 KBPS.

1.6 THEORY OF OPERATION

The INTERVIEW contains a Random Access Memory (RAM) to store data which is to be displayed. The RAM is addressed alternately by a Refresh Address Counter and a Character Position Address Counter, to alternately refresh the video applied to the CRT, and to write or update data in character positions of the display.

During a CRT refresh cycle, where data in the RAM is decoded and written on the CRT, incoming data is stored momentarily by a latch. Then, during the retrace, the data is entered into the RAM from the latch.

After a write cycle, the RAM is returned to the Refresh Address configuration, and the display shows the recently-written character. In this type of "read-write" cycle, new data is entered into the RAM only during retrace time, and cannot be updated or changed during the actual display scan time, and the display remains steady.

During the refresh cycle, data from the RAM is processed by a character generator, where the stored data is decoded and translated to character video signals. The setting of the front panel switches determine the code and font (character style) displayed.

In addition to storing data, the RAM also stores enhancement bits (REVERSE, LOW INTENSITY, BLINK) as required for certain displays.

Data is received by the RAM from the following sources:

- Receive or Transmit parallel data from INTERSHAKE
- FDX parallel data from the INTERVIEW receiver
- Function data from INTERSHAKE
- Symbol PROM in INTERVIEW that generates correct SPACE symbol for clearing each language, or "fill" symbols (#), (.), used to maintain time correlation in FDX operation.

SECTION 2

OPERATION

2.1 INTRODUCTION

The information in this section covers the operation of the INTERVIEW CRT Data Display, and describes the application of the INTERVIEW as a peripheral visual display for the INTERSHAKE series of data communications test equipment.

NOTE

The Data Format controls, located in the recessed compartment on top of the INTERVIEW II, *are not used* when the INTERVIEW II is operated with the INTERSHAKE. These controls are used *only* when the equipment is operated as a stand-alone monitor. See Part 2 of this manual for a complete description of these controls and their related functions.

2.2 OPERATING CONTROLS AND INDICATORS

Operating controls and indicators of the INTERVIEW which are used when operating with the INTERSHAKE, are located in the following areas:

- Front Panel
- Inside Cabinet on CRT Frame
- Access Panel

The controls and indicators in each of these areas, and their specific functions, are listed in Tables 2-1 through 2-3. Front Panel Controls are shown in Figure 2-1.

Table 2-1. Front Panel Controls and Indicators.

Control/Indicator	Position/Function
POWER	UP POSITION – Applies primary power to energize equipment. DOWN POSITION – Deenergizes equipment.
RED INDICATOR	LIGHTS when AC power is applied to equipment and POWER switch is in the up (energize) position.
HDX/FDX Switch	HDX POSITION – Allows test data to be displayed (written) one line at a time at normal intensity, representing one channel of data. FDX POSITION – Allows test data to be displayed two lines at a time, representing full-duplex communications. The top line is written at normal intensity; the second line and every other line thereafter is written at low intensity.
CODE Selector Switch	ASCII POSITION – Initiates decoding of CRT REFRESH MEMORY data to corresponding ASCII code characters. (See paragraph 1.2 and 1.6).

Table 2-1. Front Panel Controls and Indicators. (Continued)

Control/Indicator	Position/Function
CODE (continued)	EBCDIC POSITION – Initiates decoding of CRT REFRESH MEMORY data to corresponding EBCDIC code characters. SELECTRIC POSITION – Initiates decoding of CRT REFRESH MEMORY data to corresponding SELECTRIC code characters. EBCD POSITION – Initiates decoding of CRT REFRESH MEMORY data to corresponding EBCD code characters. A or B POSITION – Initiates decoding of CRT REFRESH MEMORY data to corresponding customer-specified code characters.
SELF TEST Switch	MOMENTARILY DEPRESSED – Initiates display of all characters, symbols and fonts produced by the character generator circuits. A set of fonts or symbols is repeated on the screen several times in Normal, Reverse, Low Intensity and Blink; and in combinations thereof. The CODE switch may be set to any position; and the display will correspond to the code selected. Unassigned characters in the selected code will appear in hexadecimal form. NOTE During self-test display, the normal test data is stored in memory. When the SELF TEST button is released, the normal data display is resumed. Data applied to the memory from the INTERSHAKE during the self-test interval is stored and then displayed when normal display is resumed.
TOTAL SCREEN	HEX POSITION – Sets character generator to display hexadecimal value of input data characters. The hexadecimal value is displayed diagonally, and increments from Ø0 to FF for a 256-character capacity. TEXT POSITION – Sets character generator to display alpha-numeric characters (128-Character ANSI) which correspond to input data. (The CODE switch must be set properly to initiate correct decoding.) Control characters are displayed as a diagonal double character abbreviation (mnemonic) for the specific control functions. For example:

Table 2-1. Front Panel Controls and Indicators. (Continued)

Control/Indicator	Position/Function
TOTAL SCREEN (continued)	A_K = ACK E_T = EOT D_1 = DC1, etc. OCTAL POSITION – Octal Position undefined when displaying an INTERSHAKE program in the load mode or play mode. Sets character generator to display octal representation of input data. The octal display increments from 000 through 377, for a total of 256 characters. The first digit of the display uses a vertical dot convention; the two remaining digits are displayed in a single vertical column.
CONTROL CHARACTERS	HEX POSITION – Performs same function as TOTAL SCREEN switch in HEX position, but *only* for control characters. (Control characters are decoded in accordance with setting on CODE selector switch.) ABBREV. POSITION – Enables display of abbreviated control characters in diagonal alpha-numeric format. OCTAL POSITION – Octal Position undefined when displaying an INTERSHAKE program in the load mode or play mode. Enables display of control character octal equivalent. NOTE: The CONTROL CHARACTER switch is electrically overridden by the TOTAL SCREEN switch to avoid conflict between settings of the two switches. The above switch funtions are appliable only when the TOTAL SCREEN switch is set to the TEXT Position.
FREEZE	AUTO POSITION – Causes the display to freeze automatically when the screen has been written full. The oldest character displayed is in the "home" position, and is enhanced by reverse blinking. Data occurring while display is frozen is *not* entered into the display memory. RUN POSITION – Enables display to be written normally as data is supplied by the INTERSHAKE. However, the display may be frozen by program command from the INTERSHAKE. MANUAL POSITION – Causes the display to freeze instantly. If enabled while a line is being written, the remainder of the line will be unblanked and will be displayed. The oldest character reverse blinks at a fast rate. While frozen, input data is lost, and the screen cannot be cleared by command from INTERSHAKE. *Freeze does not disable Page Control by INTERSHAKE.*

Table 2-1. Front Panel Controls and Indicators. (Continued)

Control/Indicator	Position/Function
CLEAR	MOMENTARY DEPRESSED – Initiates clearing of display memory. Clears 1 or 2 pages, corresponding with setting of PAGE switch. Requires minimum of 2.0 milliseconds.
PAGE	1 or 2 POSITION – Selects either Page 1 or Page 2 for display. Each provides 16 lines of 32 characters for a total of 512 characters. 1 + 2 POSITION – Selects combination of Page 1 *and* Page 2 for display. This setting provides a display of 16 lines of 64 characters for a total of 1024 characters. NOTES: If Page 1 is recorded in FDX, with TD and RD on alternate lines, the PAGE 1+2 display separates the two and displays TD on the top left screen, and RD on the top right of the screen (or, for Page 2, TD is displayed on the lower left of the screen, and RD on the lower right). In this manner, data is displayed in four quadrants to facilitate quick comparison. The INTERSHAKE is capable of selecting Page 1, Page 2, or Page 1+2 when the PAGE switch is set to the 1+2 position.
HIGHLIGHT	This two-position thumbwheel switch may be set to any two-digit hexadecimal value. Any character displayed may be highlighted by causing it to blink and appear as negative video (black character against white background). The hexadecimal value of any character may be set into the switch; the character will then be highlighted wherever it appears in the display. For example, a setting of "41" would cause the character "A" to be highlighted while operating in even parity or 7-bit ASCII.

Table 2-2. Internal CRT Controls (see Paragraph 1.4.3).

Control/Indicator	Position/Function
BRIGHTNESS	Adjusts brightness of CRT display to desired intensity.
CONTRAST	Control is adjusted to set desired display contrast.
VERTICAL SIZE	Control is set to provide desired vertical dimension of CRT image area.

Table 2-2. Internal CRT Controls (see Paragraph 1.4.3) (Continued).

Control/Indicator	Position/Function
VERTICAL LINEARITY	Control is set to produce equal spacing between scan lines from top to bottom of CRT. Characters should be of equal height and spacing at top and bottom of screen.
WIDTH	Control is set to produce the proper width of CRT image area.
HORIZONTAL LINEARITY	Control is set to produce equal character spacing (horizontal scan velocity) throughout total scan length. Character width and spacing should be identical at both the left and right sides of image.
FOCUS	Control is set to produce clearly-defined characters.

Table 2-3. Access Panel Controls and Connectors.

Control/Indicator	Position/Function
AC CONNECTOR	The AC Line Cord is connected to this connector to supply primary AC power to the equipment.
FUSE	Overcurrent protection device, 3.0 amp slow-blow.
115/230 VOLTS	Switch is set to correspond with source of primary power.
VIDEO OUTPUT	Type BNC connector used to supply composite video and sync signal to external display instrument. Signal is 2 volts P/P.
AUXILIARY CONTROL CONNECTOR	50-Pin Amphenol Connector used for control and signal interface with INTERSHAKE.

2.2.1 DTM-2 Control of Data Format

With the DTM-2, the INTERVIEW will display dual-line Full Duplex. The receiver internal to INTERVIEW must be controlled to be compatible with the receiver in the DTM-2. All data format control signals are provided through the cable for:

- SPEED (Internal/External) Derived clock is not available to the INTERVIEW receiver.
- INFO BITS
- PARITY
- SYNC, ASYNC
- SYNC BITS (Uses Function 90, see Paragraph 3.2)
- SDLC (NRZI available on INTERVIEW channel only when used with DTM-2 with serial number series "G" and above.)

2.3 TYPICAL OPERATING SEQUENCES (DTM-2)

2.3.1 Display of Program Listings in LOAD Mode

In the *LOAD* mode, the DTM-2 automatically conditions the INTERVIEW to display the DTM-2 program listing. The FDX position is electrically selected so that DTM-2 DATA are displayed on the top and every

alternate row; the *corresponding* Function numbers are displayed in the second and every alternate row. (Hex is automatically selected for the Function row so that the 2-digit function number is displayed.) Any program step with a function that does not relate to transmission of data characters will be displayed reverse image, and Data will be displayed in HEX.

Display Sequence

1. The DTM-2 is set to the LOAD mode. The Data Switches are set to FO and the FUNCTION switch is set to 99.

2. Select AUTO FREEZE then CLEAR the INTERVIEW

3. Operate the STEP switch on DTM-2 to display Step 00.

4. Operate the UP switch on DTM-2 to scroll the program onto the INTERVIEW.

5. Note that the *DATA* or *FUNCTION* switches on the DTM-2 may terminate the scroll if DATA FO or FUNCTION 99 are in the Program being listed, repeated operation of the UP switch will continue the scroll.

NOTE

When in the LOAD mode, the CLEAR push button will initiate a display of the HEX character indicative of the SPACE character for the code selected on the INTERVIEW and is *not* representative of the contents of the Program Memory. As steps are displayed, the contents of the Program Memory will appear.

2.3.2 Display of Data in RUN Mode

In the *RUN* mode, the operator may select HDX or FDX. In HDX the data analyzed by the DTM-2 will be presented to the INTERVIEW. In FDX the data analyzed by the DTM-2 will be presented to the top and alternate rows, while data on the second signal path will be displayed on the second and alternate rows. Signals on the TD and RD paths will be displayed maintaining vertical time correlation for characters occurring at the same instant on the data path. Should one path be "silent," an internally-selected "fill" symbol will be displayed to maintain time correlation with the active path.

Sequence

1. On the INTERVIEW, set the FREEZE control to RUN, PAGE switch to 1+2. This enables the DTM-2 to perform these functions under program control.

2. Set other INTERVIEW controls as may be appropriate to the test.

3. To terminate a test, depress the STOP MARK button on the DTM-2.

4. While the test is running, use of the Manual Freeze control on the INTERVIEW will prevent the program from clearing the display. Multi-Page control will continue to be under the DTM-2 control, if so programmed.

2.3.3 Display of Test Results in PLAY Mode

In the *PLAY* mode, the operator may select HDX or FDX. FDX displays the Results Memory in the same format as LOAD displays the program listing. Data is displayed on the top and odd lines; and Functions are displayed on the even lines. Non-character transmission functions will appear in reverse image. In HDX, the Data will be displayed with reverse image for non-character transmission-related data.

Sequence

The display technique for the Play Memory is similar to that for the LOAD mode. Reset to STEP 00, step *down* to STEP 63 (last page), then operate CLEAR switch. Then step UP.

2.4 TYPICAL OPERATING SEQUENCES (DTM-1)

2.4.1 Display of Program Listings in LOAD Mode

In the *LOAD* mode, the DTM-1 automatically conditions the INTERVIEW to display the DTM-1 program listing. The FDX position is electrically selected so that DTM-1 DATA are displayed on the top and odd rows and the *corresponding* Function numbers in the even rows. (Hex is automatically selected for the Function row so that the 2-digit Function number is displayed.) Any program step with a function that does not relate to transmission characters will be displayed reverse image and the Data will be displayed in HEX.

Display Sequence

1. Select AUTO FREEZE, then CLEAR* the CRT.
2. Operate STEP on DTM-1 to display Step 00.
3. Operate UP on DTM-1 to scroll the program onto the INTERVIEW display.

***NOTE**

When in the LOAD mode, CLEAR will write a HEX character indicative of the SPACE character for the code selected on INTERVIEW and is *not* representative of the contents of the Program Memory. As steps are displayed, the contents of the Program Memory will appear.

2.4.2 Receiving Display Data in RUN Mode

When the DTM is in the *RUN* mode, the operator may only select HDX. In HDX, the data analyzed by the DTM-1 will be presented to the INTERVIEW.

Sequence

1. On the INTERVIEW, set the FREEZE switch to RUN, PAGE switch to 1+2. This enables the DTM-1 to perform these functions under program control.
2. Set other INTERVIEW controls as appropriate to the test.

3. Leave the DTM-1 in the RUN mode, and set the INTERVIEW FREEZE switch to MANUAL position. When RUN indicator on DTM-1 de-energizes, alternate lines on the INTERVIEW will appear in HEX. If this is undesirable, the last step in the program could be "WAIT FOR RI OFF"; then with RI patched ON, the step could never be completed. This would allow the RUN indicator to remain energized.

4. While the test is running, setting the FREEZE control to the MANUAL position on the INTERVIEW will prevent the DTM-1 program from clearing the display.

2.4.3 Display of Test Results in PLAY Mode

With the DTM-1 in the *PLAY* mode, the operator may manually select display of HDX or FDX. FDX displays the Results Memory in the same format as LOAD displays the program listing. Data is displayed on the top and odd lines and Function on the even lines (low intensity). Non-character transmission functions will also be displayed reverse image. In HDX, the Data will be displayed with reverse image for non-character transmission-related data.

Sequence

The display technique for the Play Memory is the same as for the LOAD Mode.

2.5 CODE SELECTION

2.5.1 General

The operator may choose up to six data codes for translation of any input data. The six codes consist of four standard codes and two optional customer-specified codes. (Refer to Paragraph 1.4.4.)

STANDARD:	ASCII
	EBCDIC
	SELECTRIC
	EBCD
OPTIONS:	BCD and REV BCD or
	BCD and REV EBCD or
	BAUDOT and FIELD DATA or
	BAUDOT and REV BCD or
	BAUDOT and IPARS

Translation for display always follows the conventions of the selected code, regardless of how the input data may be coded. When the CODE selector switch is set to a code which does not correspond with the coding of the input data, the display will be unintelligible. Code translation charts for the above codes are provided in Appendix C of this manual.

2.5.2 Shift Codes

All Shift Codes will display the HOME character on the screen in the "unshift" set. The instrument logic assumes a preceding unshift character until it is updated by the next received "shift" character.

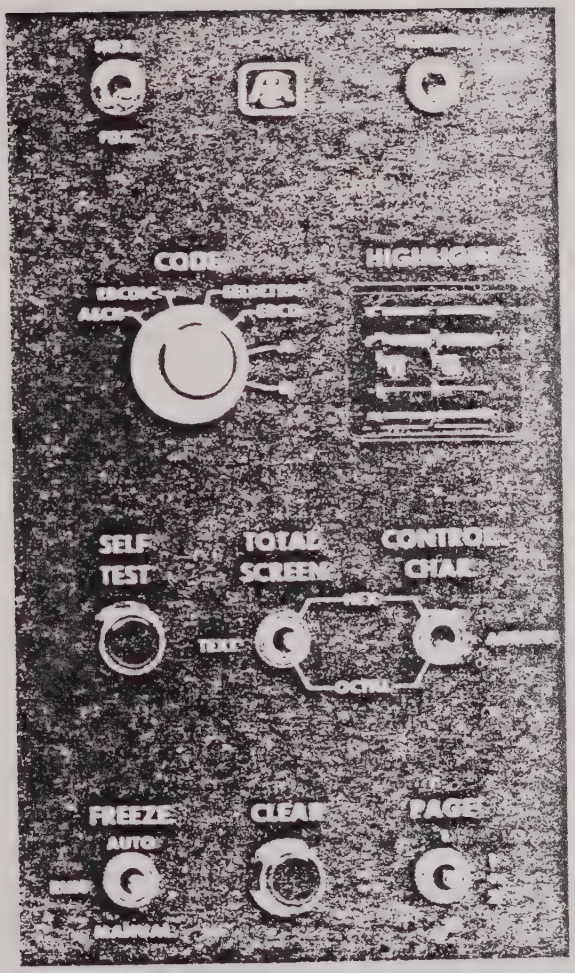


Figure 2-1. INTERVIEW Front Panel Controls.

2.6 DISPLAY SYMBOLS AND FORMAT

2.6.1 Display Font

The display font (letter and symbol style) used in the INTERVIEW is the ANSI Standard for a 7-bit code. This symbol set is shown in Figure 2-2. The ASCII code for this set is referenced at the top and side of the set. (The code shown is in the order of transmission; i.e., A0 = Least Significant Data Bit.) Each character of the set is composed of a number of dots in a 7- by 9-dot matrix.

2.6.2 Display Format

Data may be displayed by the INTERVIEW by the use of three separate formats: Text, Hexadecimal, and Octal. These formats are described in the following paragraphs.

2.6.2.1 Text Format

When the INTERVIEW is set to display characters in TEXT, the display consists of the character set shown in Figure 2-2. However, in instances where an input character has no defined symbol, the character is displayed in HEXADECIMAL to alert the operator that an undefined character has been received. In EBCDIC/BI-SYNC, the cursor addressing characters and BCC calculations are included in this category. Examples of TEXT display are shown in the left-hand column of Figure 2-3. The display symbols associated with each of the nine (9) possible input codes are shown in Tables 2-4 through 2-12.

2.6.2.2 Hexadecimal Format

An eight-bit code provides 256 unique combinations which can be displayed as two hexadecimal digits. The INTERVIEW provides a hexadecimal display format of two digits per input character, with the two digits aligned diagonally in one symbol position. Examples of the hexadecimal display format are shown in the center column of Figure 2-3. The hexadecimal equivalents of binary input data are provided in Appendix C of this manual.

2.6.2.3 Octal Format

The 256 unique combinations provided by an 8-bit binary code can also be displayed as three octal digits. When desired, the INTERVIEW provides an octal display of input characters as shown in Figure 2-4. In this format, the symbol position is divided into three (3) sections for the octal representation. The left-hand section of the symbol position is used to display the first (most significant) using a vertical column of up to three dots. The three-dot display capacity provides a choice of four digits (0, 1, 2, 3) as the most significant digit.

The remaining two digits of the octal format are displayed in a vertical column at the right of the symbol position, with the least significant digit at the bottom (see Figure 2-4).

Examples of the octal display format are shown in the right-hand column of Figure 2-3.

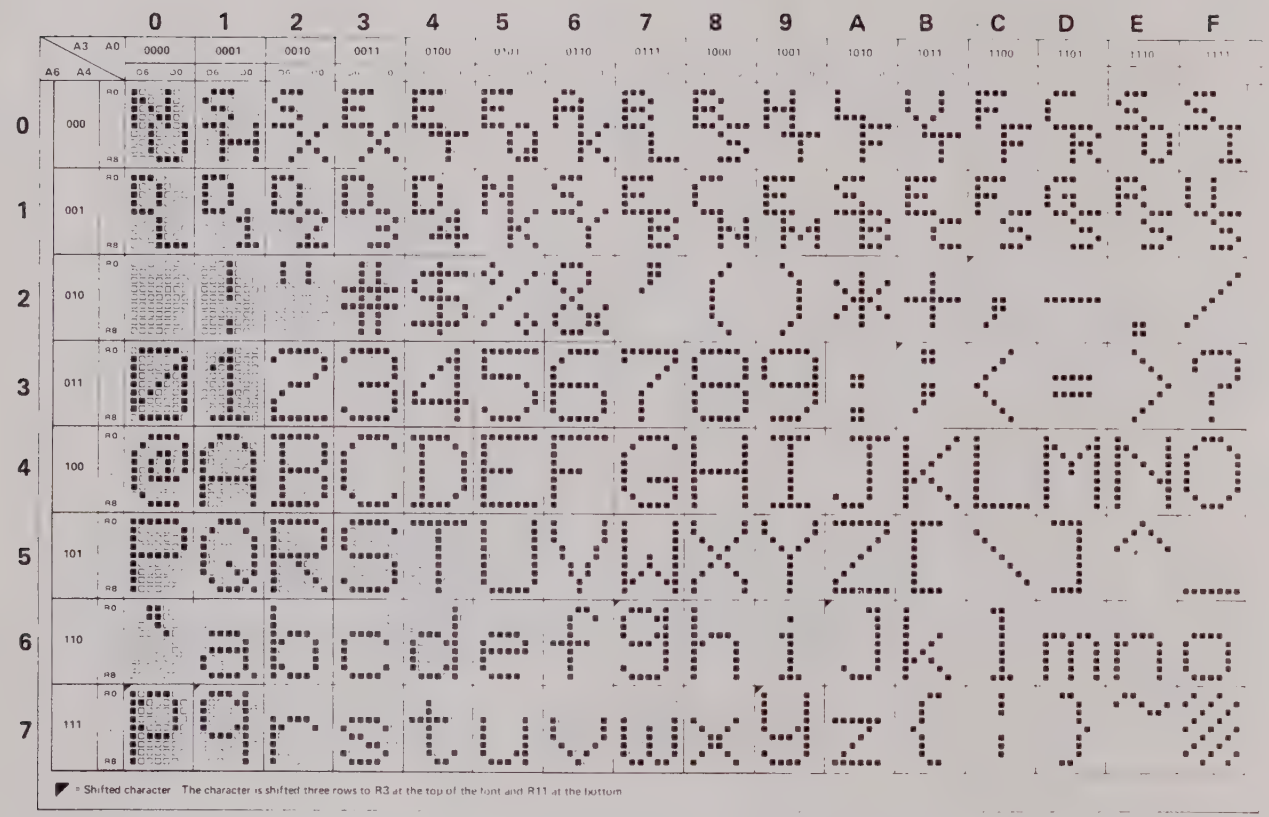
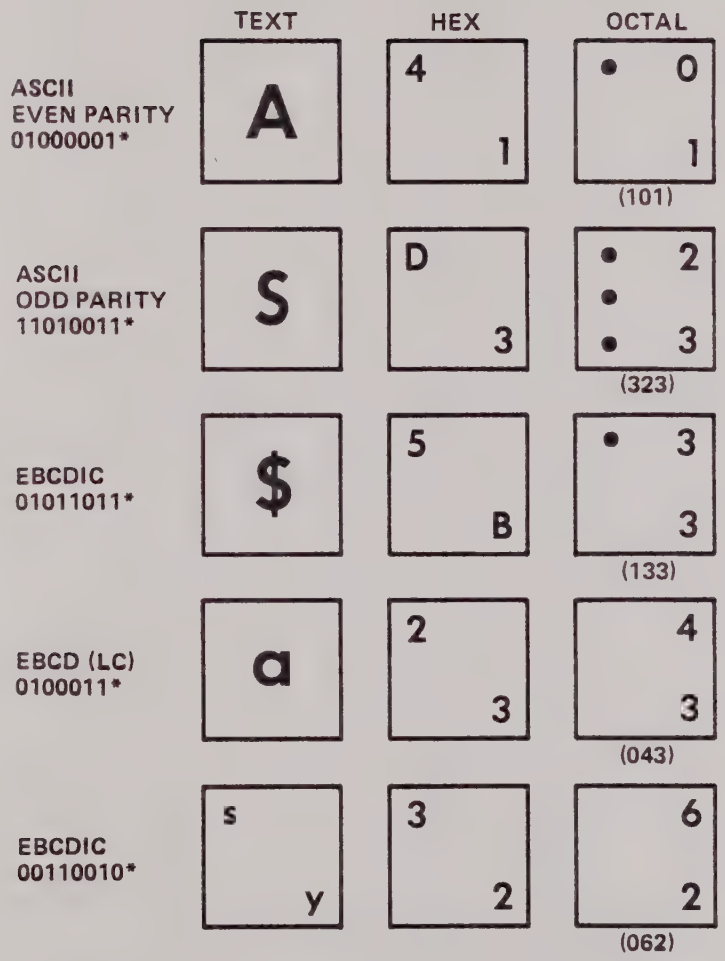


Figure 2-2. 128-Character ANSI Symbol Set for Data Communications Formed in 7 x 9 Dot Matrix Display Format.



*Least Significant Bit (LSB) is on right, and is transmitted (or received) first.

Figure 2-3. Examples of Display Format in Text, Hex and Octal.

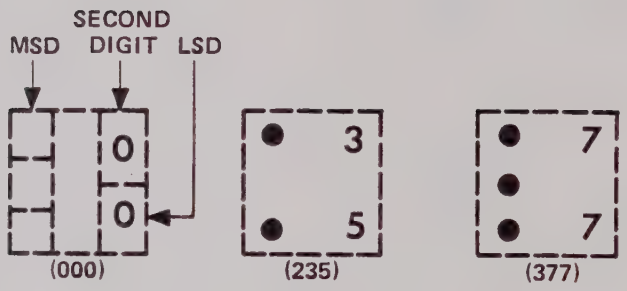


Figure 2-4. Octal Display Format Grouping in Symbol Position.

After SN-291 the following changes are effective:

HEX 07	DISPLAYS	07
60		– (minus)
61		/ (slash)
79		' (accent)
A1		~
EO		\ (reverse slash)

Table 2-4. Input Address and Corresponding Output Display Symbols for EBCDIC Data Code.

HEX ADDR	SYMB.	HEX ADDR	SYMB.	HEX ADDR	SYMB.	HEX ADDR	SYMB.	HEX ADDR	SYMB.	HEX ADDR	SYMB.
00	N_U	30*	3_0	60	–	90*	9_0	C0	{	F0	0
01	S_H	31*	3_1	61	/.	91	j	C1	A	F1	1
02	S_X	32	S_Y	62*	6_2	92	k	C2	B	F2	2
03	E_X	33*	3_3	63*	6_3	93	l	C3	C	F3	3
04	0_4	34*	3_4	64*	6_4	94	m	C4	D	F4	4
05	H_T	35*	3_5	65*	6_5	95	n	C5	E	F5	5
06*	0_6	36*	3_6	66*	6_6	96	o	C6	F	F6	6
07	▨	37	E_T	67*	6_7	97	p	C7	G	F7	7
08*	0_8	38*	3_8	68*	6_8	98	q	C8	H	F8	8
09*	0_9	39*	3_9	69*	6_9	99	r	C9	I	F9	9
0A*	0_A	3A*	3_A	6A	¦	9A*	9_A	CA*	C_A	FA*	F_A
0B	V_T	3B*	3_B	6B	,	9B*	9_B	CB*	C_B	FB*	F_B
0C	F_F	3C	D_4	6C	%	9C*	9_C	CC*	C_C	FC*	F_C
0D	C_R	3D	N_K	6D	—	9D*	9_D	CD*	C_D	FD*	F_D
0E	S_O	3E*	3_E	6E	>	9E*	9_E	CE*	C_E	FE*	F_E
0F	S_I	3F	S_B	6F	?	9F*	9_F	CF*	C_F	FF	▨
10	D_L	40	(SP)	70*	7_0	A0*	A_0	D0	}		
11	D_1	41*	4_1	71*	7_1	A1	~	D1	J		
12	D_2	42*	4_2	72*	7_2	A2	s	D2	K		
13	D_3	43*	4_3	73*	7_3	A3	t	D3	L		
14*	1_4	44*	4_4	74*	7_4	A4	u	D4	M		
15*	1_5	45*	4_5	75*	7_5	A5	v	D5	N		
16	B_5	46*	4_6	76*	7_6	A6	w	D6	O		
17*	1_7	47*	4_7	77*	7_7	A7	x	D7	P		
18	C_N	48*	4_8	78*	7_8	A8	y	D8	Q		
19	E_M	49*	4_9	79	‘	A9	z	D9	R		
1A*	1_A	4A*	4_A	7A	:	AA*	A_A	DA*	D_A		
1B*	1_B	4B	•	7B	#	AB*	A_B	DB*	D_B		
1C	F_S	4C	<	7C	@	AC*	A_C	DC*	D_C		
1D	G_S	4D	(	7D	’	AD*	A_D	DD*	D_D		
1E	R_S	4E	+	7E	=	AE*	A_E	DE*	D_E		
1F	U_S	4F*	4_F	7F	”	AF*	A_F	DF*	D_F		
20*	2_0	50	&	80*	8_0	B0*	B_0	E0	\		
21*	2_1	51*	5_1	81	a	B1*	B_1	E1*	E_1		
22*	2_2	52*	5_2	82	b	B2*	B_2	E2	S		
23*	2_3	53*	5_3	83	c	B3*	B_3	E3	T		
24*	2_4	54*	5_4	84	d	B4*	B_4	E4	U		
25	L_F	55*	5_5	85	e	B5*	B_5	E5	V		
26	E_B	56*	5_6	86	f	B6*	B_6	E6	W		
27	E_C	57*	5_7	87	g	B7*	B_7	E7	X		
28*	2_8	58*	5_8	88	h	B8*	B_8	E8	Y		
29*	2_9	59*	5_9	89	i	B9*	B_9	E9	Z		
2A*	2_A	5A	!	8A*	8_A	BA*	B_A	EA*	E_A		
2B*	2_B	5B	$	8B*	8_B	BB*	B_B	EB*	E_B		
2C*	2_C	5C	*	8C*	8_C	BC*	B_C	EC*	E_C		
2D	EQ	5D	)	8D*	8_D	BD*	B_D	ED*	E_D		
2E	AK	5E	;	8E*	8_E	BE*	B_E	EE*	E_E		
2F	BL	5F*	5_F	8F*	8_F	BF*	B_F	EF*	E_F		

*Symbol will be displayed in OCTAL when CONTROL CHARACTER switch is set to OCTAL.

Table 2-5. Input Address and Corresponding Output Display Symbols for ASCII Data Code.

HEX ADDR	SYMB.	HEX ADDR	SYMB.	HEX ADDR	SYMB.	HEX ADDR	SYMB.
00	N_U	20	(SP)	40	@	60	`
01	S_H	21	!	41	A	61	a
02	S_X	22	"	42	B	62	b
03	E_X	23	#	43	C	63	c
04	E_T	24	$	44	D	64	d
05	E_Q	25	%	45	E	65	e
06	A_K	26	&	46	F	66	f
07	B_L	27	'	47	G	67	g
08	B_S	28	(	48	H	68	h
09	H_T	29	)	49	I	69	i
0A	L_F	2A	*	4A	J	6A	j
0B	V_T	2B	+	4B	K	6B	k
0C	F_F	2C	,	4C	L	6C	l
0D	C_R	2D	-	4D	M	6D	m
0E	S_O	2E	.	4E	N	6E	n
0F	S_I	2F	/	4F	O	6F	o
10	D_L	30	Ø	50	P	70	p
11	D_1	31	1	51	Q	71	q
12	D_2	32	2	52	R	72	r
13	D_3	33	3	53	S	73	s
14	D_4	34	4	54	T	74	t
15	N_K	35	5	55	U	75	u
16	S_Y	36	6	56	V	76	v
17	E_B	37	7	57	W	77	w
18	C_N	38	8	58	X	78	x
19	E_M	39	9	59	Y	79	y
1A	S_B	3A	:	5A	Z	7A	z
1B	E_C	3B	;	5B	[	7B	{
1C	F_S	3C	<	5C	/	7C	¦
1D	G_S	3D	=	5D	]	7D	}
1E	R_S	3E	>	5E	^	7E	~
1F	U_S	3F	?	5F	–	7F	⁘

Table 2-6. Input Address and Corresponding Output Display Symbols for EBCD Data Code.

ADDR	OUT		ADDR	OUT	
	LC	UC		LC	UC
00	(SP)	(SP)	20	1	=
01	–	–	21	j	J
02	@	0_2*	22	^	?
03	&	+	23	a	A
04	8	*	24	9	(
05	q	Q	25	r	R
06	y	Y	26	z	Z
07	h	H	27	i	I
08	4	:	28	5	%
09	m	M	29	n	N
0A	u	U	2A	v	V
0B	d	D	2B	e	E
0C*	D_2	D_2	2C*	R_S	R_S
0D*	0_D	0_D	2D*	C_R	C_R
0E*	0_E	0_E	2E*	L_F	L_F
0F*	D_4	D_4	2F*	H_T	H_T
10	2	<	30	3	;
11	k	K	31	ℓ	L
12	s	S	32	t	T
13	b	B	33	c	C
14	ϕ	)	34	#	"
15	#	# ①	35	$	!
16	.	. ①	36	,	3_6*
17*	1_7	1_7	37	.	^
18	6	'	38	7	>
19	o	O	39	p	P
1A	w	W	3A	x	X
1B	f	F	3B	g	G
1C*	^	^ ②	3C*	E_T	E_T
1D*	B_S	B_S	3D*	S_Y	S_Y
1E*	1_E	1_E	3E*	S_H	S_H
1F*	\	\ ③	3F*	⁘	⁘

NOTES: ① These characters are undefined in EBCD. The INTERVIEW uses these two characters to generate the fill symbols in FDX.

② UPSHIFT.

③ DOWNSHIFT.

*Characters will be displayed in OCTAL when CONTROL CHARACTER switch is set to OCTAL.

Table 2-7. Input Address and Corresponding Output Display Symbols for SELECTRIC Data Code.

HEX ADDR	SYMBOL		HEX ADDR	SYMBOL	
	LC	UC		LC	UC
00	(SP)	(SP)	20	1	N_U
01	!	0_1	21	m	M
02	t	T	22	x	X
03	j	J	23	g	G
04	4	$	24	ϕ	)
05	o	O	25	s	S
06	ℓ	L	26	h	H
07	/	?	27	y	V
08	5	%	28	7	&
09	'	"	29	r	R
0A	e	E	2A	d	D
0B	p	P	2B	;	:
0C*	D_2	D_2	2C*	R_S	R_S
0D*	0_D	0_D	2D*	C_R	C_R
0E*	0_E	0_E	2E*	L_F	L_F
0F*	D_4	D_4	2F*	H_T	H_T
10	2	@	30	3	#
11	.	.	31	v	V
12	n	N	32	u	U
13	=	+	33	f	F
14	z	Z	34	9	(
15	#	#①	35	w	W
16*	1_6	1_6	36	b	B
17*	1_7	1_7	37	-	-
18	6	1_8	38	8	*
19	i	I	39	a	A
1A	k	K	3A	c	C
1B	q	Q	3B	,	,
1C*	^	^ ②	3C*	E_T	E_T
1D*	B_S	B_S	3D*	S_Y	S_Y
1E*	1_E	1_E	3E*	S_H	S_H
1F*	\	\ ③	3F*	⁘	⁘

NOTES: ① This character is undefined in SELECTRIC. The INTERVIEW can use this character to generate the fill symbols for FDX.

② UPSHIFT.

③ DOWNSHIFT.

*Characters will be displayed in OCTAL when CONTROL CHARACTER switch is set to OCTAL.

Table 2-8. Input Address and Corresponding Output Display Symbols for BAUDOT Data Code.

HEX ADDR	SYMB		HEX ADDR	SYMB	
	FIGS	LTRS		FIGS	LTRS
00	0_0	0_0	10	5	T
01	3	E	11	"	Z
02	L_F	L_F	12	)	L
03	-	A	13	2	W
04	0_4	(SP)	14	#	H
05	0_5	S	15	6	Y
06	8	I	16	ϕ	P
07	7	U	17	1	Q
08	C_R	C_R	18	9	O
09	$	D	19	?	B
0A	4	R	1A	&	G
0B	'	J	1B	^	^ ①
0C	,	N	1C	.	M
0D	!	F	1D	/	X
0E	:	C	1E	;	V
0F	(	K	1F	\	\ ②

NOTES: ① UPSHIFT to figures.

② DOWNSHIFT to letters.

Table 2-9. Input Address and Corresponding Output Display Symbols for FIELD Data Code.

HEX ADDR	SYMB	HEX ADDR	SYMB	HEX ADDR	SYMB	HEX ADDR	SYMB
00	0_0	10	K	20	)	30	ϕ
01	&	11	L	21	-	31	1
02	^	12	M	22	+	32	2
03	[	13	N	23	<	33	3
04	]	14	O	24	=	34	4
05	(SP)	15	P	25	>	35	5
06	A	16	Q	26	#	36	6
07	B	17	R	27	$	37	7
08	C	18	S	28	*	38	8
09	D	19	T	29	(	39	9
0A	E	1A	U	2A	%	3A	'
0B	F	1B	V	2B	:	3B	;
0C	G	1C	W	2C	?	3C	/
0D	H	1D	X	2D	!	3D	.
0E	I	1E	Y	2E	,	3E	F_F
0F	J	1F	Z	2F	@	3F	C_R

Table 2-10. Input Address and Corresponding Output Display Symbols for REVERSE EBCD Data Code.

HEX ADDR	SYMB		HEX ADDR	SYMB	
	LC	UC		LC	UC
00	(SP)	(SP)	20	-	-
01	1	=	21	j	J
02	2	<	22	k	K
03	3	;	23	l	L
04	4	:	24	m	M
05	5	%	25	n	N
06	6	'	26	o	O
07	7	>	27	p	P
08	8	*	28	q	Q
09	9	(	29	r	R
0A	ϕ	)	2A	#①	#①
0B	#	"	2B	$	!
0C	[	]	2C	\	^
0D*	F_F	F_F	2D*	C_R	C_R
0E*	^	^②	2E*	B_S	B_S
0F*	0_F	0_F	2F*	2_F	2_F
10	@	1_0	30	&	+
11	/	?	31	a	A
12	s	S	32	b	B
13	t	T	33	c	C
14	u	U	34	d	D
15	v	V	35	e	E
16	w	W	36	f	F
17	x	X	37	g	G
18	y	Y	38	h	H
19	z	Z	39	i	I
1A	.①	.①	3A*	3_A	3_A
1B	,	1_B*	3B*	.	3_B
1C	}	{	3C	~	`
1D*	1_D	1_D	3D*	3_D	3_D
1E*	1_E	1_E	3E*	\	\③
1F*	1_F	1_F	3F*	3_F	3_F

NOTES:
① These characters are undefined in REVERSE EBCD. The INTERVIEW uses these characters to generate the fill symbols for FDX.
② UPSHIFT.
③ DOWNSHIFT

*Characters will be displayed in OCTAL when CONTROL CHARACTER switch is set to OCTAL.

Table 2-11. Input Address and Corresponding Output Display Symbols for REVERSE BCD Data Code.

HEX ADDR	SYMB		HEX ADDR	SYMB	
	LC	UC		LC	UC
00	(SP)	(SP)	20	-	-
01	1	=	21	j	J
02	2	0_2*	22	k	K
03	3	;	23	l	L
04	4	:	24	m	M
05	5	%	25	n	N
06	6	'	26	o	O
07	7	"	27	p	P
08	8	*	28	q	Q
09	9	(	29	r	R
0A	ϕ	)	2A	#①	#①
0B	'	0_B*	2B	$	!
0C*	0_C	0_C	2C*	2_C	2_C
0D*	R_S	R_S	2D*	C_R	C_R
0E*	^	^ ②	2E*	B_S	B_S
0F*	E_T	E_T	2F*	2_F	2_F
10	@	1_0	30	&	+
11	/	?	31	a	A
12	s	S	32	b	B
13	t	T	33	c	C
14	u	U	34	d	D
15	v	V	35	e	E
16	w	W	36	f	F
17	x	X	37	g	G
18	y	Y	38	h	H
19	z	Z	39	i	I
1A*	1_A	1_A	3A*	3_A	3_A
1B	1_B*	,	3B	.	.
1C*	1_C	1_C	3C*	3_C	3_C
1D*	L_F	L_F	3D*	H_T	H_T
1E*	1_E	1_E	3E*	\	\ ③
1F*	1_F	1_F	3F*	⁘	⁘

NOTES: ① This character is actually undefined in REV BCD. The INTERVIEW uses this character to generate one of the fill symbols for FDX.

② UPSHIFT

③ DOWNSHIFT

*Characters will be displayed in OCTAL when CONTROL CHARACTER switch is set to OCTAL.

Table 2-12. Input Address and Corresponding Output Symbols for IPARS Data Code.

HEX INPUT	BCD LINE CODE 1248AB	SYMBOL	HEX INPUT	BCD LINE CODE 1248AB	SYMBOL
ØØ	ØØØØØØ	0_0	2Ø	1ØØØØØ	1
Ø1	ØØØØØ1	@	21	1ØØØØ1	J
Ø2	ØØØØ1Ø	0_2	22	1ØØØ1Ø	/
Ø3	ØØØØ11	$	23	1ØØØ11	A
Ø4	ØØØ1ØØ	8	24	1ØØ1ØØ	9
Ø5	ØØØ1Ø1	Q	25	1ØØ1Ø1	R
Ø6	ØØØ11Ø	Y	26	1ØØ11Ø	Z
Ø7	ØØØ111	H	27	1ØØ111	I
Ø8	ØØ1ØØØ	4	28	1Ø1ØØØ	5
Ø9	ØØ1ØØ1	M	29	1Ø1ØØ1	N
ØA	ØØ1Ø1Ø	U	2A	1Ø1Ø1Ø	V
ØB	ØØ1Ø11	D	2B	1Ø1Ø11	E
ØC	ØØ11ØØ	]	2C	1Ø11ØØ	-
ØD	ØØ11Ø1	+	2D	1Ø11Ø1	2_D
ØE	ØØ111Ø	SP	2E	1Ø111Ø	2_E
ØF	ØØ1111	%	2F	1Ø1111	2_F
1Ø	Ø1ØØØØ	2	3Ø	11ØØØØ	3
11	Ø1ØØØ1	K	31	11ØØØ1	L
12	Ø1ØØ1Ø	S	32	11ØØ1Ø	T
13	Ø1ØØ11	B	33	11ØØ11	C
14	Ø1Ø1ØØ	Ø	34	11Ø1ØØ	*
15	Ø1Ø1Ø1	:	35	11Ø1Ø1	<
16	Ø1Ø11Ø	-	36	11Ø11Ø	#
17	Ø1Ø111	?	37	11Ø111	.
18	Ø11ØØØ	6	38	111ØØØ	7
19	Ø11ØØ1	0	39	111ØØ1	P
1A	Ø11Ø1Ø	W	3A	111Ø1Ø	X
1B	Ø11Ø11	F	3B	111Ø11	G
1C	Ø111ØØ	=	3C	1111ØØ	3_C
1D	Ø111Ø1	)	3D	1111Ø1	(
1E	Ø1111Ø	[	3E	1111Ø	,
1F	Ø11111	"	3F	111111	3_F

SECTION 3

DISPLAY CONTROL BY DTM-2

3.1 GENERAL

While a test with the DTM-2 is in progress, the display features of the INTERVIEW can be controlled by certain test functions of the DTM-2 test program. Program functions which control the display features of the INTERVIEW are outlined in the following paragraphs.

3.2 FUNCTION 90 – SYNCHRONOUS SIGNALS

When the INTERVIEW and INTERSHAKE II are used in testing a synchronous circuit, the appropriate SYNC character must be entered into the DTM-2, and in full-duplex (FDX) operation, into the INTERVIEW also.

The SYNC character is loaded into the DTM-2 and INTERVIEW by using Function 90 and the SYNC character. The INTERVIEW contains an AUTO SYNC circuit which will initiate synchronized operation after receiving *two* SYNC characters. These characters *are not* displayed by the INTERVIEW; any character which follows the two SYNC characters will be displayed. When seven or eight consecutive characters with no transitions occur (FF or 00), the receiver will disable synchronization, and data input to the INTERVIEW is inhibited to increase the effective display of significant data.

NOTE

When using DTM-2 equipment with serial number D241 or below in FDX synchronous operation, the SYNC CHARACTER must be entered as follows:

1. In LOAD mode, enter SYNC CHARACTER using BIT SWITCHES and ENTER push button.

2. Step down one step to observe (on the DTM-2 Data Display) the SYNC CHARACTER which has been entered.

3. Depress ENTER SYN BITS switch on DTM-2 while the character is being displayed.

4. Write over the (dummy) entry of STEP 1 if necessary.

5. DO NOT USE FUNCTION 90 as part of the test program. Such use will automatically update SYNC character to an unknown random character. This character will be any character which is occurring on the *receive bus* at the time FUNCTION 90 is executed during the program.

3.3 FUNCTION 95 – SYNC SEARCH

When the DTM-2 receiver is not in synchronization, no data will be routed to the INTERVIEW. This condition may be induced by using a Function 95 in the test program, where the SYNC SEARCH mode is forced.

For example, when the display must be "quiet" after a certain test sequence (to preserve a display), a Function 95 will immediately inhibit any new data until a new SYNC character sequence is recognized in the data.

3.4 FUNCTION 39 – CRC CALCULATION

Function 39 is used in a test program to check the CRC calculation. The CRC characters will be displayed by the INTERVIEW while **the calculation is being performed.**

NOTE

When using DTM-2 equipment with serial number C238 and below, the CRC characters will *not* be displayed, but will repeat the character preceding ETX *and* the ETX.

3.5 FUNCTION 94 – PERIPHERAL CONTROL

Function 94 is used to activate any of eight flags which initiate control of the INTERVIEW. These flags are selected using the "X" portion of the hexadecimal data character "XY." The "Y" portion can then be either a "1" to enable the flag or a "0" to disable the flag. The flags are assigned as follows:

FLAG	INTERVIEW CONTROL
0	CLEAR
1	PAGE 1
2	PAGE 2
3	FREEZE
4	UNASSIGNED
5	REVERSE ENHANCEMENT
6	LOW INTENSITY ENHANCEMENT
7	BLINK ENHANCEMENT

These control flags initiate control as follows:

- CLEAR — The CLEAR operation requires two milliseconds delay to ensure that data will be displayed following the operation. Thus, a preferred sequence is:

FUNCTION	DATA	OPERATION
94	01	CLEAR ON
80	02	DELAY 2 mS
94	00	CLEAR OFF

The CLEAR operation also returns the CRT cursor to the HOME position.

- PAGE 1
  PAGE 2 — The PAGE selection permits display of PAGE 1 or PAGE 2. Without this selection, the display automatically shows the 1024-character composite of PAGE 1 + PAGE 2.

- FREEZE — Freezes display in three microseconds and inhibits display of new data in any mode. When used, the DTM-2 cannot clear screen. Display can be cleared manually.

- REVERSE — This flag initiates display of character(s) with reverse video, providing black symbol on white background.

- LOW INTENSITY — This enhancement causes character or symbol to be displayed at reduced brightness.

- BLINK — This enhancement causes a displayed character to blink ON and OFF at approximately one-second intervals.

Combinations of REVERSE, LOW INTENSITY and BLINK can be programmed to provide up to eight unique enhancements.

3.6 HALF-DUPLEX SYNCHRONOUS OPERATION (HDX)

For HDX operation, the receiver in the DTM-2 is fully programmable. The following Functions should be used:

FUNCTION	DESCRIPTION
90	Enter SYNC bits. (See Paragraph 3.2.)
94	Peripheral controller will be initialized by the start switch to enable normal display; e.g., enhancements are OFF, FREEZE is OFF, PAGES 1 and 2 controlled by front panel switch on INTERVIEW. Set Enhancements as desired.
95	AUTO SYNC (HEX 10) will present Receive data to the INTERVIEW until eight PAD or NULL characters are received. HEX 14 will inhibit the data to the display after four PAD or NULL characters. This eliminates INTERVIEW space filled by idle time. NOTE: Timing should NEVER be estimated by counting IDLE characters on the CRT display.

3.7 SDLC OPERATION

In SDLC the following Functions must be used in either HDX or FDX:

FUNCTION	DESCRIPTION
90	Enter SYNC bits as 7E
94	Peripheral Controller
95	AUTO SYNC
96	SDLC Mode selection

NOTE

The Receiver in the INTERVIEW will delete "0" and display data. NRZI decoding is NOT included for the INTERVIEW receiver in FDX (this is the only limitation with FDX).

3.8 AUTOMATIC SYNCHRONIZATION (AUTO SYNC)

The AUTO SYNC (Function 95, Data 10) maintains synchronization of the receiver logic at all times in *both* INTERVIEW and INTERSHAKE instruments. There is no requirement for *bit shifting* or *bit sliding*. When a short IDLE period occurs, the following SYNC characters may not be delayed an exact multiple of character times. The following SYNC character will occur "bit shifted" from its anticipated position. The receiver, upon receipt of the entire SYNC pattern (one or two characters as selected), will automatically become synchronized. During the receipt of the skewed SYNC characters, they will be assembled bit skewed and will be displayed on the INTERVIEW as random characters (depending on the number of Bits skewed) until a complete SYNC pattern is received.

An example of skewed SYNC characters is found in most BI-SYNC Polling sequences: "SY, SY, SY, ET, IDLE, SY, SY, 40, 40 . . ." The IDLE is usually four bits long; therefore, the second pair of SYNCs will be displaced four bits. The INTERVIEW will DISPLAY: "SY, ET, F3, 23, 40, 40 . . ." Had the IDLE been 12 bits long, the display would be: "SY, ET, FF, F3, 23, 40, 40 . . ." It should be noted in these examples that only the SYNC characters appear skewed. Skew is eliminated after the first complete SYNC pattern has been received.

3.9 SCREEN FULL SENSING

When the INTERVIEW screen is full, a logic signal is available to the DTM-2. This signal may be tested in several ways using Functions 73, 75, 77 and 78 and Data Bit 1 instead of the RS-232 interface leads, as follows:

FUNCTION	DATA	DESCRIPTION
73	01	Wait until screen is full (receive data will display until screen is full, then next step can Freeze the display).
75	01	Interrupts when screen is full. The interrupt Vectors to step 60 (last page) and should be serviced within 2 mS to freeze the display before vertical retrace completes.
77,78	01	Jump decisions can be used to continue a repeated program or sub-routine until the screen is full.

Note the signal is true or ON until the screen is full. When the screen is full, the signal is OFF.

3.10 PROMPTING MESSAGES TO INTERVIEW

MESSAGES to operator via INTERVIEW. Comments can be programmed into the DTM and written to the INTERVIEW to explain a test result or call the attention of the operator.

When the DTM-2 is in the ON-LINE (or MONITOR) mode, the transmitter in the DTM-2 can not transmit onto either the TD or RD leads. However, the transmit Functions 50's and 60's operate internally at the selected data rate. Using these functions to send specific characters or messages will initiate their display on the INTERVIEW without disrupting the data path being monitored. Enhancements are also operative, to allow the "comment" from the DTM-2 to be clearly highlighted.

NOTE

In the OFF line mode the Auto-Panel Function 93 can be used to momentarily place the DTM-2 in the monitor TD or RD mode so the comment can be written to the INTERVIEW without transmitting it onto the circuit under test. Temporary selection of the highest data speed using Function 92 (e.g., INT OSC 56KBS) will shorten the time required to write the comment.

3.11 FULL DUPLEX OPERATION IN TEST MODE

This configuration permits the operator to observe the response of various system equipment to a local test. In the TEST MODEM or TEST TERMINAL configuration, the serial data applied to the INTERVIEW originates from the "other" source. For example, in the TEST TERMINAL configuration, the serial data signal is obtained from the MODEM.

In order to observe FDX, the following manual operations are required:

1. The equipment *not under test* must be disconnected from the DTM-2.

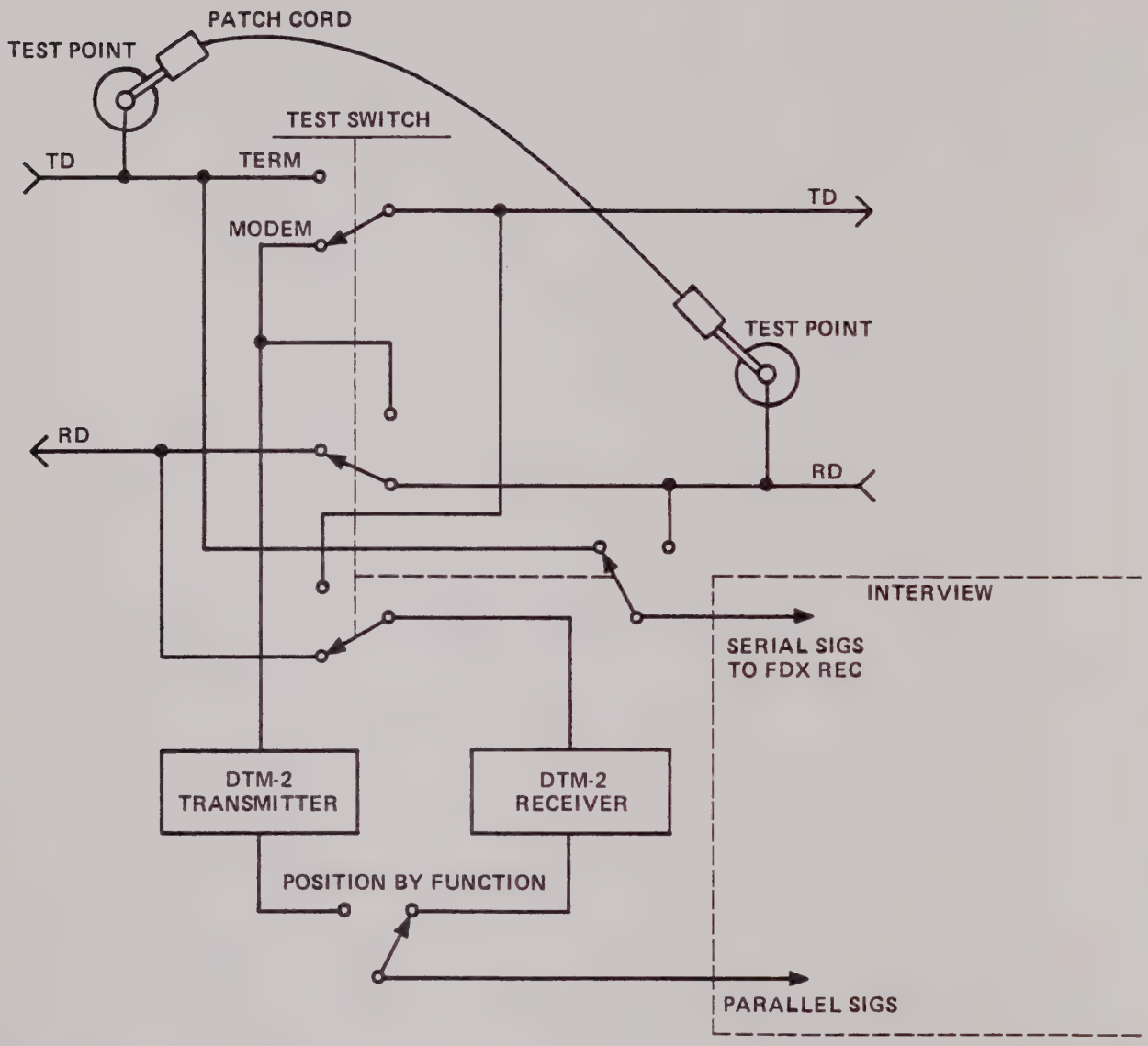
2. The TD and RD test points on the DTM-2 must be patched together.

NOTE

This is the *only* configuration which requires that the equipment *not under test* be disconnected.

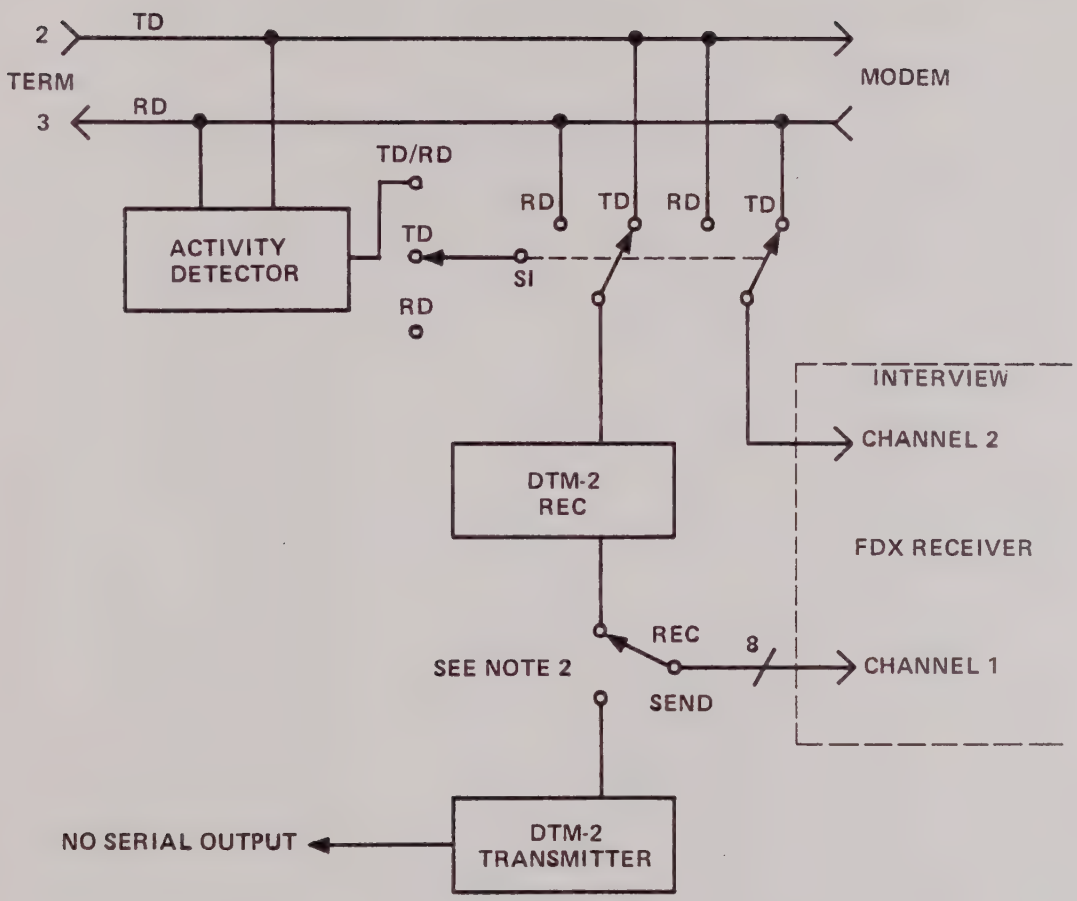
3.12 SIGNAL PATHS FOR TEST CONFIGURATIONS

The two basic signal paths established by the DTM-2 and INTERVIEW are shown in Figures 3-1 and 3-2. Figure 3-1 relates the "Test Mode," where TEST TERMINAL or TEST MODEM is selected. Figure 3-2 shows the signal path while the DTM-2 is used as a monitoring instrument.



PATCH CORD is only required for FDX display when DTM-2 is in TEST MODEM or TEST TERMINAL mode.

Figure 3-1. Signal Patch for INTERSHAKE (DTM-2) and INTERVIEW in Test Mode.



NOTES:

1. SI is manually selected on the Front Panel (or by Auto Panel Function 93).
2. Receiver Data are always presented in the RUN mode EXCEPT:
   A) Function 90 to enter SYNC bits
   B) Functions 50, 51, 52, 53, 54 and 60 thru 67 presents Send Data characters.

Figure 3-2. Signal Path for INTERSHAKE (DTM-2) and INTERVIEW in MONITOR mode.

SECTION 4

DISPLAY CONTROL BY DTM-1

4.1 GENERAL

Display control by the INTERSHAKE I (DTM-1) is somewhat limited, as opposed to control by the INTERSHAKE II (DTM-2). Available control functions are outlined in the following paragraphs:

The DTM-1 presents *receive* data only to the INTERVIEW. The HDX/FDX switch on the INTERVIEW may *not* be operated in the FDX position.

While the DTM-2 presents transmitted data (FUNCTIONS 5X, 6X) to the INTERVIEW, the DTM-1 presents only received signals.

4.2 DTM-1 CONTROL FUNCTIONS

The DTM-1 can be programmed to control the INTERVIEW display using the following Functions:

FUNCTION	DATA	DESCRIPTION
70	02	Freezes display
71	02	Enables display
70	XX	Reverse ON } (Patch selected control
71	XX	Reverse OFF } lead to DET T.P.)

The following Enhancements are automatically obtained:

Enhancement	Responds to
LOW INTENSITY	Low intensity is assigned to active data on the RD lead.
BLINK	Characters containing Parity Errors will blink.

4.3 TESTING SYNCHRONOUS SIGNALS

The INTERVIEW will display data after it is in SYNC. The DTM-1 must be programmed with the correct SYNC character, either manually or with Function 90. One or two SYNC characters can be selected within the DTM-1 by using a strap. The INTERVIEW will not display the first SYNC character when in the two-character SYNC mode.

The criteria for being OUT SYNC are also important because the DTM-1 must be out of SYNC to look for new SYNC (whereas the DTM-2 has AUTO SYNC). Refer to the DTM-1 manual for the OUT OF SYNC

convention. See also "INTERSHAKE ANSWER" No. 23. Generally, after the information is extracted from the signal, a SYNC SEARCH FUNCTION 95 will quiet the receiver (no more INTERVIEW data will be displayed) and enable it to look for the next SYNC pattern.

4.4 PROMPTING MESSAGES TO INTERVIEW

Comments or messages can be programmed into the DTM and displayed to the INTERVIEW. Alert the operator by using "AUTO PANEL" Function 93 to select *SELF MONITOR*. The internal receiver will then receive the prompt message and display it.

When the DTM-1 is in the ON-LINE (or MONITOR) mode, the transmitter in the DTM-1 cannot transmit onto either the TD or RD leads; however, the transmit Functions 50s and 60s will operate internally at the selected data rate. Using these functions to send specific characters or messages for comments will display them on the INTERVIEW without disrupting the data Path being monitored by using Function 93 to select SELF MONITOR.

NOTE

In the Off-Line mode, the Auto Panel Function 93 can be used to momentarily place the DTM-1 in the SELF MONITOR mode so the comment can be written to the INTERVIEW without transmitting it to the circuit under test. Temporary selection of the highest data speed will shorten the time required to write the comment.

The Reverse enhancement is also operative, thus allowing the "comment" from the DTM-1 to be clearly highlighted.

SECTION 5

INTERVIEW APPLICATIONS (DTM-2)

5.1 GENERAL

The applications covered in this section are typical examples of how the INTERVIEW may be used in practical test configurations. Applications are shown for operation with the INTERSHAKE II (DTM-2) instrument.

The following paragraphs show techniques for programming the DTM-2 to provide control of the INTERVIEW display.

The START switch on DTM-2 initializes the INTERVIEW controls to UNFREEZE, 1024 characters (Page 1 + 2), and Enhancements OFF. These controls may be generated at any point in the user's test program to obtain the desired display characteristics.

5.2 MONITOR: DISPLAY ALL DATA ON TD AND RD (Single Line)

Select the TEST TD/RD position on the DTM-2 so the DTM-2 will assign itself to the active signal path. Enhance the Receive Data by REVERSE image to assist in distinguishing between Transmit and Receive Data.

5.2.1 Circuit Description

- SYNC
- BI-SYNC Protocol, EBCDIC
- FDX, Point-to-Point, idle time between turn-around of system (transmission is *not* simultaneous on both paths).

5.2.2 DTM-2 Set-up

CONTROL	SETTING
BIT RATE	EXTERNAL (use modem clocks)
INFO BITS	8
PARITY	NONE
SYNC/ASYNC	SYNC
TEST	TD/RD
CONTROL EIA (toggle)	OFF
EIA (toggle)	EIA

5.2.3 INTERVIEW Set-up

CONTROL	SETTING
FDX/HDX	HDX
CODE	EBCDIC
PAGE	1 + 2
FREEZE	RUN
TOTAL SCREEN	TEXT
CONT. CHAR.	ABBREV.

5.2.4 Program Techniques

See Program Form (Figure 5-1).

NOTES

1. A maximum of 8 idle characters (PAD-FF or NULL-00) will be displayed by the CRT. Idle characters will then be inhibited in order to use the display more efficiently when long turnaround times exist in the system under test.

2. The two characters *following* an idle period of less than eight characters in duration are to be disregarded. They can be SYNC characters that are bit-skewed by an idle period not containing a multiple of eight bits. See Paragraph 3.3 for an explanation of AUTO SYNC operation.

3. Timing should not be inferred by counting idle FF characters. Use the DTM-2 time duration measurement, Function 87.

5.3 MONITOR: DISPLAY ALL DATA ON TD AND RD (Dual Line)

Select the TEST TD or the TEST RD position on the DTM-2 as desired. Data from the selected lead will be presented to the DTM-2 for program analysis and will be displayed in full intensity on the CRT. The data on the other (non-selected) path will be displayed on the CRT in low intensity. No other enhancement is necessary to distinguish the TD from the RD data.

5.3.1 Circuit Description

- SYNC
- BI-SYNC Protocol
- FDX – Simultaneous transmission in each direction is permitted.

INTERSHAKE II PROGRAM

TITLE: *MONITOR: DISPLAY ALL DATA ON TD AND RD (Single Line)*

FILE NO.

SHEET 1 OF 1

DESCRIPTION:

For displaying synchronous data occurring on both the TD and the RD leads in in systems using non-simultaneous transmission. Refer to paragraph 5.2.

OBJECTIVE:

ADDRESS PAGE (CIRCLE ONE) 3 2 1 (0)		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C 8 4 (0)	0	0	*32*	*90*	*Enter SYNC Bits*	
	1	1	*10*	*95*	*AUTO SYNC*	
	2	2	*59*	*94*	*RD ACTIVITY = REVERSE IMAGE*	
	3	3	*00*	*00*	*HALT*	
	4	4				
	5	5				
	6	6				
	7	7				
	8	8				
	9	9				
	A	10				
	B	11				
	C	12				
	D	13				
	E	14				
	F	15				
D 9 5 1	0	16				
	1	17				
	2	18				
	3	19				
	4	20				
	5	21				
	6	22				
	7	23				
	8	24				
	9	25				
	A	26				
	B	27				
	C	28				
	D	29				
	E	30				
	F	31				

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

CODE *EBCDIC*

SPEED *EXT*

ASYNC / (SYNC)

SYN CHARACTER *HEX 32*

STOP BIT 1.0 , 1.5 , 2.0

INFO BITS 5 , 6 , 7 , (8)

PARITY (NONE) , ODD , EVEN

CONTROL EIA (OFF)

ON-LINE (TD/RD) TD , RD

OFF-LINE TERM / MODEM

MON SIGS (NORMAL)

PATCH CORDS

CONTROL EIA (V. 24)

COUNTER ZONE

INTERRUPTS

FLAGS

LATCH

CONTINUE ON OTHER SIDE

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CONTINUE ON OTHER SIDE

Figure 5-1.

5.3.2 DTM-2 Set-up

CONTROL	SETTING
BIT RATE	EXTERNAL (MODEM CLOCK)
INFO BITS	8
PARITY BITS	NONE
ASYNC/SYNC	SYNC
TEST	TD or RD
CONTROL EIA/OFF	OFF
EIA/MIL	EIA

5.3.3 INTERVIEW Set-up

CONTROL	SETTING
FDX/HDX	FDX
CODE	EBCDIC
PAGE	1 + 2
FREEZE	RUN
TOTAL SCREEN	TEXT
CONTROL. CHAR.	ABBREV.

5.3.4 Program Technique

See Program Form (Figure 5-2).

NOTES

1. Data are written on the INTERVIEW two lines at a time. The time correlation is indicated by horizontal time slots. For example:

   . . ABCD . .
   . . . . QZ . .

   The Q occurred after B, but before C.

2. TIME FILL symbol (.) or (#) is presented to the screen to indicate that no character was present on that Path between two consecutive characters on the other Path.

3. When either receiver is out of Sync, in the DTM-2 or INTERVIEW, a time fill symbol will be generated to indicate IN SYNC and OUT SYNC conditions.

4. See also NOTES for Paragraph 5.2.4.

INTERSHAKE II PROGRAM

TITLE: *MONITOR: DISPLAY ALL DATA ON TD AND RD (Dual Line)*

FILE NO.

SHEET 1 OF 1

DESCRIPTION:

For displaying synchronous data occurring on both the TD and RD leads in systems using simultaneous transmission. Refer to paragraph 5.3.

OBJECTIVE:

ADDRESS (PAGE CIRCLE ONE) 3 2 1 (0)		ENTRY STEP	ENTRY DATA	ENTRY FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C 8 4 (0)	0	0	32	90	Enter SYNC Bits	
	1	1	10	95	AUTO SYNC	
	2	2	00	00	HALT	
	3	3				
	4	4				
	5	5				
	6	6				
	7	7				
	8	8				
	9	9				
	A	10				
	B	11				
	C	12				
	D	13				
	E	14				
	F	15				
D 9 5 1	0	16				
	1	17				
	2	18				
	3	19				
	4	20				
	5	21				
	6	22				
	7	23				
	8	24				
	9	25				
	A	26				
	B	27				
	C	28				
	D	29				
	E	30				
	F	31				

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

- CODE: *EBCDIC*
- SPEED: *EXT*
- ASYNC / (SYNC)
- SYN CHARACTER: *HEX 32*
- STOP BIT: 1.0 , 1.5 , 2.0
- INFO BITS: 5 , 6 , 7 , (8)
- PARITY: (NONE) ODD , EVEN
- CONTROL EIA (OFF)
- ON-LINE: TD/RD , (TD) , (RD)
- OFF-LINE: TERM / MODEM
- MON SIGS (NORMAL)
- PATCH CORDS
- CONTROL EIA (V. 24)
- COUNTER ZONE
- INTERRUPTS
- FLAGS
- LATCH

CONTINUE ON OTHER SIDE

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CONTINUE ON OTHER SIDE

Figure 5-2.

5.4 MONITOR: SELECTIVELY DISPLAY, ENHANCE, AND CAPTURE DATA

The objective of this application is to accomplish the following:

1. Display receive data in Reverse Image (in response to the RLSD lead OFF).
2. Display in Low Intensity the portion of a message after STX through ETX (BCC will be bright).
3. Ignore any response from the STATION with address AA.
4. Freeze the display after receipt of a NAK.
5. Indicate capture of NAK message with an audible tone.

5.4.1 Circuit Description

- SYNC
- BI-SYNC Protocol, EBCDIC
- FDX, multi-point, nonsimultaneous transmission

5.4.2 DTM-2 Set-up

CONTROL	SETTING
BIT RATE	EXTERNAL
INFO BITS	8
PARITY	NONE
ASYNC/SYNC	SYNC
TEST	TD or RD
EIA/MIL	EIA
CONTROL EIA/OFF	OFF

5.4.3 INTERVIEW Set-up

CONTROL	SETTING
FDX/HDX	HDX
CODE	EBCDIC
PAGE	1 + 2
FREEZE	RUN
TOTAL SCREEN	TEXT
CONT. CHAR.	ABBREV.

5.4.4 Program Techniques

See Figure 5-3.

INTERSHAKE II PROGRAM

TITLE: MONITOR: SELECTIVELY DISPLAY, ENHANCE AND CAPTURE DATA.

FILE NO.

SHEET 1 OF 1

DESCRIPTION:

Refer to paragraph 5.4.

OBJECTIVE:

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	ENTRY DATA	ENTRY FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C 8 4 (0)	0	0	32	90	Enter SYNC Bits	
	1	1	10	95	AUTO SYNC	
	2	2	5A	94	RLSD OFF = Reverse Image	
(0)	3	3	30	94	Freeze OFF "REPEAT"	←
	4	4	01	94	Clear ON	
	5	5	02	80	2ms	
	6	6	00	94	Clear OFF	
	7	7	02	98	NO-OP	
(0)	8	8	01	14	Wait 1 Char "NEXT"	←
	9	9	02	98	NO-OP	
(0)	A	10	16	41	Preset "FIND"	←
	B	11	02	46	Retest and Jump = STX "LOW ON"	→
	C	12	19	41	Preset	
	D	13	03	46	Retest and Jump = ETX "LOW OFF"	→
	E	14	28	41	Preset	
	F	15	37	46	Retest and Jump = EOT "FREEZE OFF"	→
D 9 5 1	0	16	2D	46	Retest and Jump = ENQ "FREEZE OFF"	→
	1	17	2B	41	Preset	
	2	18	3D	46	Retest and Jump = NAK "CAPTURE"	→
	3	19	20	41	Preset	
	4	20	C1	46	Retest and Jump = A "ADDRESS"	→
	5	21	08	40	JUMP "NEXT"	→
(1)	6	22	61	94	LOW ON "LOW ON"	←
	7	23	08	40	JUMP "NEXT"	→
	8	24	/	/		
(1)	9	25	60	94	LOW OFF "LOW OFF"	←
	A	26	08	40	JUMP "NEXT"	→
	B	27				
	C	28				
	D	29				
	E	30				
	F	31				

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

- CODE: EBCDIC
- SPEED: EXT
- ASYNC (SYNC)
- SYN CHARACTER
- STOP BIT: 1.0 , 1.5 , 2.0
- INFO BITS: 5 , 6 , 7 , (8)
- PARITY: (NONE) , ODD , EVEN
- CONTROL EIA (OFF)
- ON-LINE TD/RD (TD) (RD)
- OFF-LINE TERM / MODEM
- MON SIGS / NORMAL
- PATCH CORDS
- CONTROL EIA (V. 24)
- COUNTER ZONE
- INTERRUPTS
- FLAGS
- LATCH

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CONTINUE ON OTHER SIDE

Figure 5-3.

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS		JUMP ← →	ADDITIONAL INFORMATION (WRITE IN)
E A 6 2 0	0	32	0A	41	Preset	"ADDRESS"	←	
	1	33	C1	45	Jump ≠ A	"FIND"	→	
	2	34	7F	45	Jump ≠ " (7F)	"FIND"	→	
	3	35	7F	45	Jump ≠ " (7F)	"FIND"	→	
	4	36	2D	45	Jump ≠ ENQ	"FIND"	→	
	5	37	31	94	Freeze ON			
	6	38	0A	40	Jump	"FIND"	→	
	7	39						
2	8	40	30	94	Freeze OFF	"Freeze OFF"	←	
	9	41	08	40	Jump	"NEXT"	→	
	A	42						
2	B	43	31	94	Freeze ON	"CAPTURE"	←	
	C	44	01	70	Beep ON			
	D	45	10	81	100 ms			
	E	46	01	71	Beep OFF			
	F	47	00	00	HALT			
F B 7 3	0	48	03	41	Jump	"REPEAT"	→	
	1	49						
	2	50						
	3	51						
	4	52						
	5	53						
	6	54						
	7	55						
	8	56						
	9	57						
	A	58						
	B	59						
	C	60						
	D	61						
	E	62						
	F	63						

ADDITIONAL REMARKS

PROGRAM LOCATION
DTM S/N
CELL
RAM
PROM

PROGRAM WRITTEN BY: DATE

COMPANY NAME: TEL. NO.

ADDRESS:

FORM NO. TP-139-3-77

Figure 5-3. Continued.

NOTES

1. STX and BCC will be normal. Text and ETX will be low intensity.

2. Poll address C1, C1, 7F, 7F, 2D will be displayed but no traffic will be displayed until after an EOT is present on either the TD or RD lead indicating that an acceptable response has been received.

3. If C1, C1, 7F, 7F does not respond and there is no reply EOT, the display will be re-enabled by the next ENQ (Step 16).

4. Other approaches to re-enabling the display for the situation of Note 3 are: using an interrupt time out; "jump testing" the RLSD lead; or RTS lead status.

5. Operating start or halt will clear the screen.

6. Manual selection of the Page switch would allow capturing one NAK message on Page 1, then another on Page 2. The Page can be automatically sequenced under program control.

7. See also notes to Paragraph 5.2.4.

SECTION 6

INTERVIEW APPLICATIONS (DTM-1)

6.1 GENERAL

The following paragraphs show techniques for programming two typical examples of DTM-1 control of the INTERVIEW.

The START switch on DTM-1 initializes the INTERVIEW controls to UNFREEZE and Enhancements OFF. These controls may be generated at any point in the user's test program to obtain the desired INTERVIEW display characteristics.

6.2 MONITOR: PROTOCOL DISPLAY AND NAK CAPTURE

This program performs these basic operations:

1. Deletes message text (character after STX through ETX).
2. Receive Data is displayed LOW INTENSITY.
3. All NAK characters are displayed in Highlight.

6.2.1 Circuit Characteristics

SYNC
BI-SYNC, EBCDIC
NON-Simultaneous transmission FDX

6.2.2 DTM-1 Settings

CONTROL	SETTING
BIT RATE	EXTERNAL
INFO BITS	8
PARITY	NONE
ASYNC/SYNC	SYNC
TEST	TD/RD
EIA/MIL	EIA
CONTROL EIA/OFF	OFF

6.2.3 INTERVIEW Settings

CONTROL	SETTING
FDX/HDX	HDX
CODE	EBCDIC
TOTAL SCREEN	TEXT
HIGHLIGHT	3D (NAK)
FREEZE	RUN

6.2.4 Program

See Figure 6-1.

NOTES

1. Leave the DTM-1 in the RUN mode and set FREEZE switch to MANUAL position on the INTERVIEW. When the DTM-1 RUN indicator is OFF, alternate lines will appear in HEX (as in the LOAD mode). Last step in program could be "wait for RI OFF" and then patch RI ON, so that step never completes – RUN indicator stays lit.

2. Text following STX through and including ETX will not be displayed.

3. All NAK characters will be highlighted on the CRT screen as they appear. The Reverse blink enhancement is easily visible.

6.3 MONITOR: FREEZE NAK MESSAGES

This program performs the following basic operations in displaying the data:

1. Receive data is displayed LOW INTENSITY.

2. All data to the INTERVIEW is displayed until a NAK freezes the display for visual analysis.

3. All ENQ characters are Highlighted.

4. All characters with Parity errors Blink.

INTERSHAKE I PROGRAM

TITLE: MONITOR: PROTOCOL DISPLAY AND NAK CAPTURE

FILE NO.

SHEET 1 OF 1

DESCRIPTION:

Refer to paragraph 6.2.

OBJECTIVE:

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	ENTRY DATA	ENTRY FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C 8 4 0	0	0	00	94	WRITE OVER RESULTS MEMORY	
	1	1	00	96	RESTART HERE (STEPS 03,04)	
	2	2	00	95	RESYNC REC	
	3	3	32	24	TEST FOR VALID SYN #2	
	4	4	37	24	TEST FOR EOT	
	5	5	00	95	RESYNC REC	
	6	6	00	96	RESTART HERE	
	7	7	02	24	TEST FOR STX	
	8	8	02	71	FREEZE ON	
	9	9	03	20	TRAP ETX	
	A	10	02	70	FREEZE OFF	
	B	11	00	98		
	C	12				
	D	13				
	E	14				
	F	15				
D 9 5 1	0	16				
	1	17				
	2	18				
	3	19				
	4	20				
	5	21				
	6	22				
	7	23				
	8	24				
	9	25				
	A	26				
	B	27				
	C	28				
	D	29				
	E	30				
	F	31				

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

- CODE: EBCDIC
- SPEED: EXT
- ASYNC / (SYNC)
- SYN CHARACTER: HEX 32
- STOP BIT: 1.0 , 1.5 , 2.0
- INFO BITS: 5 , 6 , 7 , (8)
- PARITY: (NONE) ODD , EVEN
- CONTROL EIA (OFF)
- ON-LINE: (TD/RD) TD , RD
- OFF-LINE: TERM / MODEM
- MON SIGS (NORMAL)
- PATCH CORDS
- CONTROL EIA (V. 24)
- COUNTER ZONE
- INTERRUPTS
- FLAGS
- LATCH

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Figure 6-1.

6.3.1 Circuit Characteristics

SYNC
EBCDIC
NON-Simultaneous transmission FDX

6.3.2 DTM-1 Settings

CONTROL	SETTING
BIT RATE	EXTERNAL
INFO BITS	8
PARITY	NONE
ASYNC/SYNC	SYNC
TEST	TD/RD
EIA/MIL	EIA
CONTROL EIA/OFF	OFF

6.3.3 Interview Setting

CONTROL	SETTING
FDX/HDX	HDX
CODE	EBCDIC
TOTAL SCREEN	TEXT
HIGHLIGHT	2D (ENQ)
FREEZE	RUN

6.3.4 Program

See Figure 6-2.

NOTES

1. Note 1 of Paragraph 6.2.4 applicable.
2. Functions requiring a BCD match such as Function 32 will never find a match with Data=FF and this step will never complete. The RUN indicator will remain ON.
3. On a multi-drop Poll, the addresses after EOT may be displayed as "displaced," bit shifted codes if idle periods of less than 8 bits are present.

INTERSHAKE II PROGRAM

TITLE: *MONITOR: FREEZE NAK MESSAGE*

FILE NO.

SHEET *1* OF *1*

DESCRIPTION:

Refer to paragraph 6.3.

OBJECTIVE:

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C 8 4 0	0	0	32	90	ENTER SYNC	
	1	1	00	94	WRITE OVER RESULTS MEMORY	
	2	2	00	95	START SYNC SEARCH	
	3	3	3D	20	TRAP NAK	
	4	4	02	71	FREEZE ON	
	5	5	F	32	LOG CHARACTERS ("forever")	
	6	6				
	7	7				
	8	8				
	9	9				
	A	10				
	B	11				
	C	12				
	D	13				
	E	14				
	F	15				
D 9 5 1	0	16				
	1	17				
	2	18				
	3	19				
	4	20				
	5	21				
	6	22				
	7	23				
	8	24				
	9	25				
	A	26				
	B	27				
	C	28				
	D	29				
	E	30				
	F	31				

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

CODE: *EBCDIC*

SPEED: *EXT*

ASYNC / (SYNC)

SYN CHARACTER: *HEX 32*

STOP BIT: 1.0 , 1.5 , 2.0

INFO BITS: 5 , 6 , 7 , (8)

PARITY: (NONE) ODD , EVEN

CONTROL EIA: (OFF)

ON-LINE: (TD/RD) TD , RD

OFF-LINE: TERM / MODEM

MON SIGS: (NORMAL)

PATCH CORDS

CONTROL EIA (V. 24)

COUNTER ZONE

INTERRUPTS

FLAGS

LATCH

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Figure 6-2.

NOTES

NOTES

OM 860B

PART 2

OPERATORS MANUAL

INTERVIEW™ II CRT

JUNE 1978

Manufactured by:

ATLANTIC RESEARCH CORPORATION
Teleproducts Division
5390 Cherokee Avenue
Alexandria, Virginia 22314

OM 860B

PART 2

IMPORTANT NOTE

PART 2 of this manual covers the operation of the INTERVIEW II™ as a stand-alone CRT Data Display and Monitor.

Refer to PART 1 of this manual for operation of the INTERVIEW *and* INTERVIEW II as peripheral data displays used with the INTERSHAKE series of test equipment.

OPERATOR'S MANUAL

for

INTERVIEW II CRT

JUNE 1978

PART 2

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Figure 1-1. INTERVIEW II CRT Display,
(Portable Configuration).

SECTION 1

GENERAL INFORMATION

1.1 INTRODUCTION

The information in this manual covers the general description, operation, and operational capabilities of the INTERVIEW II CRT Data Display, and describes the application of the instrument in troubleshooting and monitoring data communications systems.

The INTERVIEW II, in the portable configuration, is shown in Figure 1-1.

1.2 PURPOSE AND USE OF EQUIPMENT

The INTERVIEW II is a CRT data display, designed to operate independently as a highly versatile troubleshooting instrument and on-line monitor in data communications systems.

The INTERVIEW II provides a wide variety of operational features which permit test personnel to troubleshoot any standard RS-232/V.24 communications line quickly and efficiently. Test personnel may view data as it is transmitted or received on a communications line, in virtually any code or protocol. Characters may be trapped or highlighted; data displays may be "frozen" and stored for off-line analysis; full duplex data (send and receive) may be viewed simultaneously.

The equipment operates with synchronous or asynchronous data format in full duplex (FDX) or half-duplex (HDX) systems, and is compatible with any of six selectable data codes as follows:

- ASCII
- EBCDIC
- SELECTRIC
- EBCD
- A
- B

(A, B: Customer Specified Option)

The INTERVIEW is capable of displaying data in any of three characteristic styles (fonts), as follows:

- CLEAR TEXT: Upper/Lower Case Alpha-Numeric, 128-Character ANSI, plus two-character abbreviations, (e.g., control characters S_Y, E_T, A_K). See Figure 2.3.
- HEXADECIMAL: Two-Digit Alpha-Numeric, 256-Character total (00-FF).

- OCTAL: Three-Digit; One dot column vertical array plus two column alpha-numeric, 256-Character total, (000-377).

Test data applied to the INTERVIEW is stored as it is received in a "CRT Refresh Display" memory. The data is then decoded and translated to the desired display font at the time of display. In this manner, it is possible to store test data for future manual analysis. For example, a quantity of test data may be entered in the Refresh Display memory and "frozen". In this state, no new data may be entered into the Refresh Display memory, and the entered data can be displayed indefinitely. While the data is displayed, the operator may decode it in any of the selectable codes to determine the original coding scheme.

In addition to the decoding capabilities and display fonts provided, the INTERVIEW II is capable of producing a wide variety of display enhancements to highlight critical or pertinent data to attract immediate operation attention.

1.3 FUNCTIONAL DESCRIPTION

1.3.1 General Operation

The INTERVIEW II is a CRT data display, designed specifically for use as an on-line monitor and troubleshooting instrument in data communications systems.

In the normal operating configuration, the cable which extends from the SCM-1 module (located on top of the equipment, under the hinged compartment lid) is connected to the 50-pin connector on the access panel at the side of the instrument. The special test cable, supplied with the INTERVIEW II, is then installed in the line to be monitored, with the "T" connection of the cable inserted into the DB-25 connector on the SCM-1 module.

Control of the INTERVIEW II display is accomplished through the use of controls on the SCM-1 module (data format characteristics) and the front panel of the INTERVIEW II (display characteristics and features). A complete description of operating controls and their functions is included in Section 2 (Operation) of this manual.

1.3.2 Operating Speed

Operating speed of the INTERVIEW II is determined by the clock signal used in the system under test, or the data rate of the test signal. Display writing speed of the INTERVIEW can be maintained at a maximum system data rate of 62 KBPS Full-Duplex (FDX).

Clock breathing, common to FDX circuits, causes the "slower" channel to display a "fill" symbol periodically to maintain correct time correlation between the two circuits. In order to maintain a steady display, data bits applied to the INTERVIEW II are first stored, and then written into the CRT memory only during sweep retrace time, which eliminates display flicker. The process of data entry into memory only during retrace imposes the maximum operating speed.

1.3.3 Display Characteristics

The INTERVIEW II employs a 9-inch (diagonal) CRT to produce an image area of approximately five inches by seven inches. The basic display provides:

1024 CHARACTERS – 16 Lines of 64 Characters (Two Pages)
512 CHARACTERS – 16 Lines of 32 Characters (One Page)

This dual-page feature permits two separate data blocks to be displayed in either a composite or comparative manner.

When Full-Duplex data is displayed with the dual-page feature, a four-quadrant comparison can be achieved, where the screen is divided into four quadrants. The top two quadrants represent Page 1, and the bottom two quadrants represent Page 2. The two left quadrants represent Transmit Data, and the right two quadrants represent Receive Data (see Figure 1-2c).

As data is written onto the screen, the character sequence starts at the top of the screen at the left, and advances from left to right, top to bottom, until the display is complete. When the screen is filled, the character sequence starts at the top left of the screen and rewrites the display. As each new line is started at the left of the CRT, the complete line displayed previously is blanked to present a clear indication of new data being displayed.

When the AUTO FREEZE is employed, the oldest character blinks rapidly, and is located in the *home* position (upper left corner). The display freezes only after a complete page is written.

When the MANUAL FREEZE is employed, the oldest character blinks rapidly, and is located immediately after the last character written. The display freezes immediately when the switch is depressed, and the remainder of a line being written is unblanked to show the remaining contents of that line.

Other display characteristics include character enhancements, undefined character enhancements, and font selection of text and/or control characters. These display features are described in detail in Section 2 (Operation) of this manual.

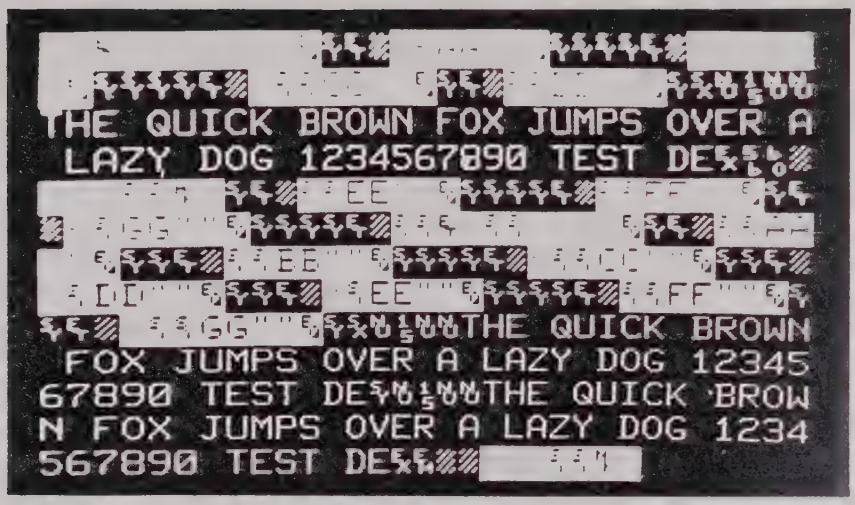
1.4 PHYSICAL DESCRIPTION

The INTERVIEW II is manufactured in both portable and rack-mounted configurations. Both models are functionally identical, but differ physically as outlined in the following paragraphs.

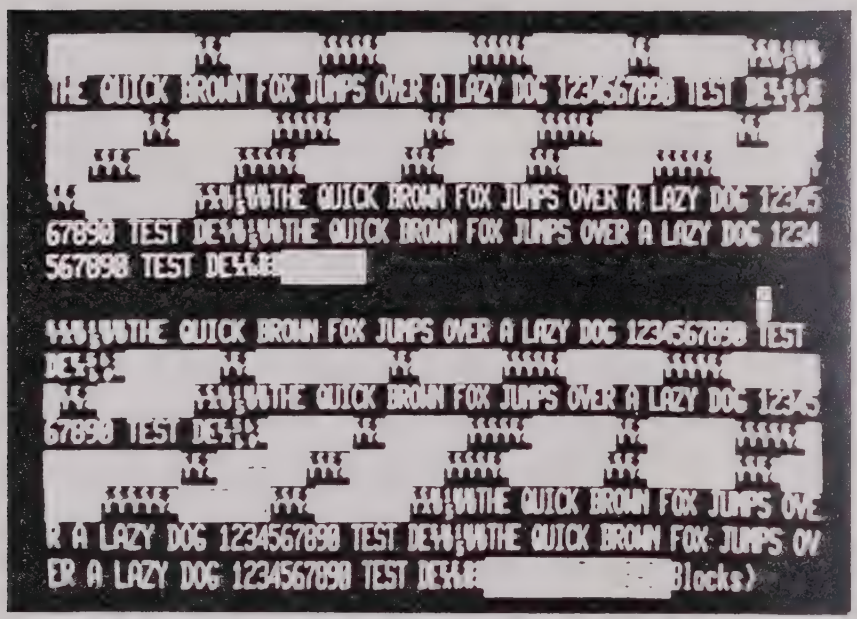
1.4.1 Portable INTERVIEW II

The portable INTERVIEW II is shown in Figure 1-1. Rails on the unit permit horizontal use on a bench or desk; or the unit may be positioned vertically (on the floor), with front panel facing upward. The unit measures 8.5 inches (20.6 cm) high, 14 inches (35.6 cm) wide, and 21.5 inches (54.6 cm) deep and weighs approximately 34 pounds (15.5Kg).

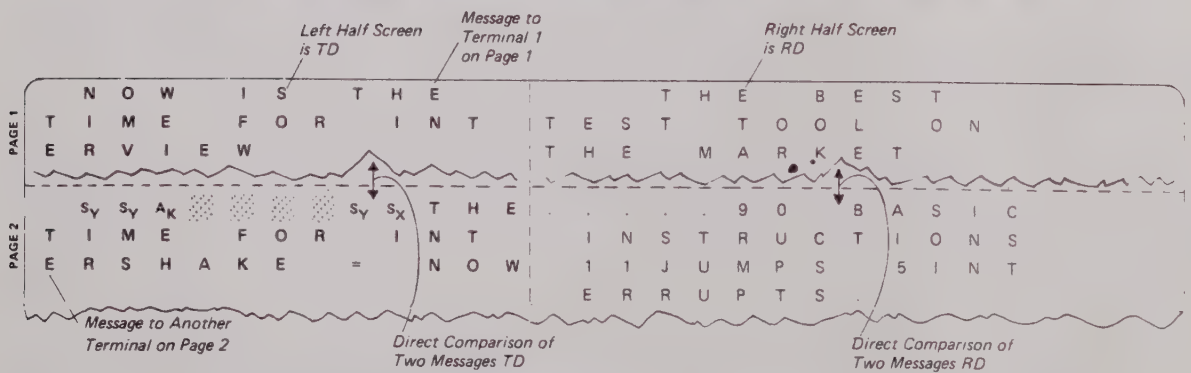
A compartment on top of the unit provides access to all "data format" controls on the SCM-1 module, and provides storage area for the power cord and interconnecting test cables. A panel on the side of the unit provides access to the test cable connector (AUX INTERFACE), power connector, video output connector, fuse, and input voltage (115/230) selector switch.



a. 512-Character Display (Page 1)



b. 1024-Character Display (Page 1 + Page 2)



c. Full-Duplex Four-Quadrant Display

Figure 1-2. INTERVIEW Display Modes.

1.4.2 Rack-Mounted INTERVIEW II

The rack-mounted INTERVIEW II consists of two separate units, and is shown in Figure 1-1b. The units are designed to be mounted in a standard 19-inch equipment cabinet. Provisions are made on the rear of the CRT chassis for all power, signal and interface connections. The front panel is 8.75 inches (22.2 cm) high by 19.0 inches (48.3 cm) wide. The unit is 20.0 inches (50.8 cm) deep and weighs approximately 34 pounds (15.5 Kg).

The "data format" control panel used with the rack-mounted INTERVIEW II is also designed for rack-mounting directly above or below the CRT chassis. The control panel measures 3-1/2" high X 13" deep X 19" wide and weighs approximately 9 pounds.

1.4.3 Factory Settings

Internal adjustments, such as Brightness, Contrast, Horizontal and Vertical Size, Linearity, etc. have been set at the factory to provide an optimum display. These internal controls should be set by qualified service personnel only when necessary.

1.4.4 Optional Code Translation

In a standard configuration, the INTERVIEW II is supplied with the four following code translation capabilities:

- ASCII
- EBCDIC
- SELECTRIC
- EBCD

These codes are listed on the front panel at the CODE Selector switch. Two additional positions of the CODE Selector switch (A and B) provide for translation of two option codes, as specified by the user. These two additional codes are available in the five following combinations:

Option 1:	A	BCD	Option 4:	A	BAUDOT
	B	REV BCD		B	REV BCD
Option 2:	A	BCD	Option 5:	A	BAUDOT
	B	REV EBCD		B	IPARS
Option 3:	A	BAUDOT			
	B	FIELD DATA			

These options are normally installed at the factory to meet the requirements of the user. Refer to Appendix A for instructions covering field installation of optional code translation modules:

NOTE

REV CODES HAVE HIGH ORDER BIT (Most Significant Bit) TRANSMITTED FIRST.

1.5 QUICK REFERENCE SPECIFICATIONS

1.5.1 Size

Portable INTERVIEW II	–	8.5" X 13" X 21.5" (20.6 cm X 35.6 cm X 54.6 cm)
Rack-Mount INTERVIEW II	–	8.75" X 19" X 20.0" (22.2 cm X 48.3 cm X 50.8 cm)
Rack-Mount INTERVIEW Control Panel	–	3.5" X 19" X 13" (8.9 cm X 48.3 cm X 33 cm)

1.5.2 Weight

Approximately 34 pounds (15.5 Kg).
Control Panel (For Rack-Mount): 9.5 pounds (4.3 Kg)

1.5.3 Power Requirements

115/230V AC, external switch selected. 50/60 Hz, internal setting. Rotate header assembly shown in Figure A-2 180° for selection. Header is shown in 60 Hz position. 110 watts maximum. Control Panel for rack-mount INTERVIEW II also operates from a primary power source of 115/230V AC.

1.5.4 Input Signal Requirements

EIA or MIL through DB25 connector on SCM-1.

1.5.5 Video Output

Composite, 2 volts P/P, Negative sync, BNC Connector (RS-170 compatible).

1.5.6 Display Area

Approximately 5" X 7" aspect ratio; 9-inch diagonal CRT.

1.5.7 Data Codes

ASCII	SELECTRIC
EBCDIC	(A) CUSTOMER SPECIFIED
EBCD	(B) CUSTOMER SPECIFIED

1.5.8 Display Characters

128-Character ANSI
256-Character HEXADECIMAL
256-Character OCTAL

1.5.9 Display Capacity

1-Page (16 Lines, 32 Characters)
2-Page (16 Lines, 64 Characters)

1.5.10 Display Enhancements

Character Reverse Image/Low Intensity for RD in TD/RD Mode
Character Blink for Parity Errors when Parity Test is enabled
Reverse Image/Blink slow for Highlight
Reverse Image/Blink Fast for Oldest Displayed Character

1.5.11 Display Speed

Accepts Full Duplex data at data rates up to 62 KBPS.

1.6 THEORY OF OPERATION

The INTERVIEW contains a Random Access Memory (RAM) to store data which is to be displayed. The RAM is addressed alternately by a Refresh Address Counter and a Character Position Address Counter, to alternately refresh the video applied to the CRT, and to write or update data in character positions of the display. During a CRT refresh cycle, where data in the RAM is decoded and written on the CRT, incoming data is stored momentarily by a latch. Then, during the retrace, the data is entered into the RAM from the latch.

After a write cycle, the RAM is returned to the Refresh Address configuration, and the display shows the recently-written character. In this type of "read-write" cycle, new data is entered into the RAM only during retrace time, and cannot be updated or changed during the actual display scan time, and the display remains steady.

During the refresh cycle, data from the RAM is processed by a character generator, where the stored data is decoded and translated to character video signals. The setting of the front panel switches determine the code and font (character style) displayed.

In addition to storing data, the RAM also stores enhancement bits (REVERSE, LOW INTENSITY, BLINK) as required for certain displays.

Data is received by the RAM from the following sources:

- Receive or Transmit parallel data from SCM-1 module serial/parallel commuters
- FDX parallel data from the INTERVIEW receiver
- Symbol PROM in INTERVIEW that generates correct SPACE symbol for clearing each language, or "fill" symbols (#), (.), used to maintain time correlation in FDX operation.

SECTION 2

OPERATION

2.1 INTRODUCTION

The information in this section covers the operation of the INTERVIEW II CRT Data Display. The detailed operation of all controls is discussed, and instructions are given to produce a wide variety of display characteristics and enhancements.

2.2 OPERATING CONTROLS AND INDICATORS

Operating controls and indicators of the INTERVIEW II are located in the following areas:

- FRONT PANEL (Display Characteristics & Features)
- SCM-1 MODULE (Data Format & Speed RS-232/V.24 Input)
- INSIDE CABINET ON CRT FRAME (Maintenance Adjustments)
- ACCESS PANEL (Signal Connectors & Power Selection)

The controls and indicators in each of the above areas, and their specific functions, are listed in Tables 2-1 through 2-4. Front Panel controls are shown in Figure 2-1; controls located on the SCM-1 module are shown in Figure 2-2.

Table 2-1. Front Panel Controls and Indicators.

Control/Indicator	Position/Function
POWER	UP POSITION — Applies primary power to energize equipment. DOWN POSITION — Deenergizes equipment.
RED INDICATOR	LIGHTS when AC power is applied to equipment and POWER switch is in the up (energize) position.
HDX/FDX Switch	HDX POSITION — Allows test data to be displayed (written) one line at a time at normal intensity, representing one channel of data. FDX POSITION — Allows test data to be displayed two lines at a time, representing full-duplex communications. The top line is written at normal intensity; the second line and every other line thereafter is written at low intensity.
CODE Selector Switch	ASCII POSITION — Initiates decoding of CRT refresh memory data to corresponding ASCII code characters.

Table 2-1. Front Panel Controls and Indicators. (Continued)

Control/Indicator	Position/Function
CODE (continued)	EBCDIC POSITION – Initiates decoding of CRT refresh memory data to corresponding EBCDIC code characters. SELECTRIC POSITION – Initiates decoding of CRT refresh memory data to corresponding SELECTRIC code characters. EBCD POSITION – Initiates decoding of CRT refresh memory data to corresponding EBCD code characters. A or B POSITION – Initiates decoding of CRT refresh memory data to corresponding customer-specified code characters.
SELF TEST Switch	MOMENTARILY DEPRESSED – Initiates display of all characters, symbols and fonts produced by the character generator circuits. A set of fonts or symbols is repeated on the screen several times in Normal, Reverse, Low Intensity and Blink; and in combinations thereof. The CODE switch may be set to any position; and the display will correspond to the code selected. Unassigned characters in the selected code will appear in hexadecimal form. NOTE During self-test display, the normal input data is stored in memory. When the SELF TEST button is released, the normal data display is resumed. Data applied to the memory during the self-test interval is stored and then displayed when normal display is resumed.
TOTAL SCREEN	HEX POSITION – Sets character generator to display hexadecimal value of input data characters. The hexadecimal value is displayed diagonally, and increments from 00 to FF for a 256-character capacity. TEXT POSITION – Sets character generator to display alpha-numeric characters (128-Character ANSI) which correspond to input data. (The CODE switch must be set properly to initiate correct decoding.) Control characters are displayed as a diagonal double character abbreviation (mnemonic) for the specific control functions. For example:

Table 2-1. Front Panel Controls and Indicators. (Continued)

Control/Indicator	Position/Function
TOTAL SCREEN (continued)	A_K = ACK E_T = EOT D_1 = DC1, etc. OCTAL POSITION – Octal Position undefined when displaying an INTERSHAKE program in the load mode or play mode. Sets character generator to display octal representation of input data. The octal display increments from 000 through 377, for a total of 256 characters. The first digit of the display uses a vertical dot convention; the two remaining digits are displayed in a single vertical column.
CONTROL CHARACTERS	HEX POSITION – Performs same function as TOTAL SCREEN switch in HEX position, but *only* for control characters. (Control characters are decoded in accordance with setting on CODE selector switch.) ABBREV. POSITION – Enables display of abbreviated control characters in diagonal alpha-numeric format. OCTAL POSITION – Octal Position undefined when displaying an INTERSHAKE program in the load mode or play mode. Enables display of control character octal equivalent. NOTE: The CONTROL CHARACTER switch is electrically overridden by the TOTAL SCREEN switch to avoid conflict between settings of the two switches. The above switch funtions are appliable only when the TOTAL SCREEN switch is set to the TEXT Position.
FREEZE	AUTO POSITION – Causes the display to freeze automatically when the screen has been written full. The oldest character displayed is in the "home" position, and is enhanced by reverse blinking. Data occurring while display is frozen is *not* entered into the display memory. RUN POSITION – Enables display to be written normally as data is supplied by the data line. MANUAL POSITION – Causes the display to freeze instantly. If enabled while a line is being written, the remainder of the line will be unblanked and will be displayed. The oldest character reverse blinks at a fast rate. While the display is frozen, input data is lost.

Table 2-1. Front Panel Controls and Indicators. (Continued)

Control/Indicator	Position/Function
CLEAR	MOMENTARY DEPRESSED – Initiates clearing of display memory. Clears 1 or 2 pages, corresponding with setting of PAGE switch. Requires minimum of 2.0 milliseconds.
PAGE	1 or 2 POSITION – Selects either Page 1 or Page 2 for display. Each provides 16 lines of 32 characters for a total of 512 characters. 1 + 2 POSITION – Selects combination of Page 1 *and* Page 2 for display. This setting provides a display of 16 lines of 64 characters for a total of 1024 characters. NOTES: If Page 1 is recorded in FDX, with TD and RD on alternate lines, the PAGE 1+2 display separates the two and displays TD on the top left screen, and RD on the top right of the screen (or, for Page 2, TD is displayed on the lower left of the screen, and RD on the lower right). In this manner, data is displayed in four quadrants to facilitate quick comparison.
HIGHLIGHT	This two-position thumbwheel switch may be set to any two-digit hexadecimal value. Any character displayed may be highlighted by causing it to blink and appear as negative video (black character against white background). The hexadecimal value of any character may be set into the switch; the character will then be highlighted wherever it appears in the display. For example, a setting of "41" would cause the character "A" to be highlighted while operating in even parity or 7-bit ASCII.

Table 2-2. SCM-1 Controls and Indicators.

Control/Indicator	Position/Function
RS-232/V.24 INPUT Connector	High-Impedance (bridging) input for data, clock, and control lead signals.
TD SCT RTS CTS RD SCR RSLD Indicators	The seven red LED indicators show the status of the corresponding leads on the RS-232/V.24 line under test. Each indicator will light when the signal on the lead is a SPACE (+ voltage) signal.
SOURCE Switch	TD Position – Selects data on the TD lead for display and for testing by the TRAP. When operating in FDX, the TD data will be displayed on the *top* and subsequent alternate lines; RD data will be displayed on the *second* and subsequent alternate lines. When operating in HDX, only the TD data will be displayed. RD Position – Selects data on the RD lead for display and for testing by the TRAP. When operating in FDX, the RD data will be displayed on the *top* and subsequent alternate lines; TD data will be displayed on the *second* and subsequent alternate lines. When operating in HDX, only the RD data will be displayed. TD/RD Position – Selects data on both the TD and RD leads for display and for testing by the TRAP. When operating in FDX, the *active* lead will be displayed on the top line and subsequent alternate lines. When operating in HDX, the data on *both* leads will be displayed on the same line, *with the RD data displayed in negative video*. **WARNING** When the TD/RD position is selected for FDX operation, the resulting display will be *unintelligible* when both TD and RD leads are active simultaneously. This position can only be used when TD and RD leads are active alternately.
EIA/MIL Switch	EIA Position – Establishes compatibility with standard EIA convention: MARK = -3 to -25 Volts MIL Position – Estabilshes compatibility with standard MIL convention: MARK = +3 to +25 Volts,

Table 2-2. (continued) SCM-1 Controls and Indicators

Control/Indicator	Position/Function
AUTO SYNC Switch	AUTO SYNC Position – Initiates condition where all received data is *continuously* searched for SYNC pattern. Display automatically resynchronizes any time the SYNC pattern is recognized in the data stream. This function is particularly useful when certain protocols permit a SYNC pattern which is "skewed" from a previous SYNC pattern by less than one character period or multiple thereof. OFF Position – Initiates condition where a SYNC pattern is detected once, and data is displayed continuously until an "out of SYNC" condition occurs, such as TRAP, RESET, IDLE, etc. If SYNC skewing occurs when AUTO SYNC is OFF, all displayed data which occurs after the skewed SYNC pattern will be displayed unintelligibly. **NOTE** AUTO SYNC should be set to the OFF position when operating with a protocol which permits consecutive data characters which could be decoded as skewed SYNC patterns.
SUPPRESS IDLE Switch	SUPPRESS IDLE Position – Initiates condition where display will stop and go out of SYNC after the occurrence of eight consecutive idle characters (00 or FF). Data is then examined for a SYNC pattern before data display is resumed. OFF Position – When switch is in the OFF position, idle characters are displayed continously for as long as they appear in the received data.
DERIVED CLOCK Switch	DERIVED CLOCK Position – Initiates condition in which internal logic of the INTERVIEW II generates clock signal based on speed of received data. The DERIVED CLOCK may be used in SYNC and in SDLC and SDLC/NRZI protocols. When DERIVED CLOCK is used, the SPEED and RANGE switches must be set to the operating speed of the system under test. OFF Position – In the OFF position, the clock signal is taken from the system under test in synchronous operation (SCT and SCR leads).

Table 2-2. (continued) SCM-1 Controls and Indicators

Control/Indicators	Position/Function
SDLC Switch	SDLC Position – Enables the INTERVIEW II to decode SDLC, ADCCP and HDLC protocols. Display automatically synchronizes on the FRAME characters (7E), and goes out of synchronization on ABORT signals (FF) if SUPPRESS IDLE switch is enabled. The CODE LEVEL switch must be set to the correct synchronous code level (normally 8 bits). OFF Position – Disables decoding of SDLC, ADCCP and HDLC protocols.
NRZI Switch	NRZI Position – Enables decoding of data which has been encoded in an NRZI format. May be used in SYNCHRONOUS and SDLC protocols. OFF Position – Disables decoding of data which has been encoded in an NRZI format.
RANGE/SPEED Switches	These two switches are used to establish the speed for system CLOCK when displaying ASYNCHRONOUS data or using the DERIVED CLOCK function. The RANGE switch can be set to either the HI, MED or LOW positions, which permits setting of the SPEED switch to any of the following positions: HI / MED / LOW 9.6K / 1.2K / 110 7.2K / 1050 / 75 4.8K / 600 / 74.2 3.6K / 300 / 66.7 2.4K / 200 / 56.9 2.0K / 150 / 50 1.8K / 135 / 45.5 C / B / A **NOTE** Settings are in bits/second; A, B and C are user-specified settings from 30 to 19.2K bps.
CODE LEVEL Switch	This switch can be set to either the SYNCHRONOUS or ASYNCHRONOUS areas, at a single setting for 5, 6, 7, or 8 bits (per character). The switch is set to correspond to the format and code level of the data being received on the line under test. **NOTE** The number of bits shown on this switch *includes* parity when applicable.

Table 2-2. (continued) SCM-1 Controls and Indicators

Control/Indicator	Position/Function
TRAP Switch	FREEZE Position — Initiates a condition which causes the display to freeze when a predetermined character is detected in the received data. (This "trap" character is set into the eight TRAP CHARACTER switches.) The trap character plus the following six characters are displayed before the display is frozen. The RESET switch must be depressed to restore the display. DELETE Position — Initiates a condition which causes the "trap" character to be deleted from the display wherever it is detected in the received data. This is useful for deleting idle SYNC or FRAME characters from the display. OFF Position — Disables trap character functions.
RESET/LOAD SYNC Pushbutton	DEPRESSED Position — Performs several functions as follows: 1. After a TRAP-FREEZE function is performed, resets circuits to provide continuing display. 2. Causes display to go out of synchronization and stops display of unintelligible data. Initiates search for new SYNC pattern. 3. In FDX operation, loads the FIRST SYNC character into decoding circuits to initiate SYNC character recognition for the second receiver in the INTERVIEW II.
PARITY TEST Switch	ODD Position — Initiates testing of each received character for odd parity. Those characters containing parity errors will blink. EVEN Position — Initiates testing of each received character for even parity. Those characters containing parity errors will blink. OFF Position — No parity testing is performed on incoming data characters.
TRAP CHARACTER Switches	These toggle switches are set to correspond to the bit pattern of any character which is to be trapped. The switches are numbered 1 through 8, *right to left;* bit #1 is the *first* bit received. For code levels of less than 8 bits, the high-order bits are ignored. When PARITY TEST is enabled, the TRAP CHARACTER switch for the *parity bit* is ignored and superceded by the *correct parity.* Switches placed in the UP position correspond to MARK; the DOWN position corresponds to SPACE.

Table 2-2. (continued) SCM-1 Controls and Indicators

Control/Indicator	Position/Function
FIRST SYNC/SECOND SYNC Switches	These two sets of toggle switches are set to correspond to the bit pattern of two SYNC characters. The switches are numbered 1 thru 8; the first bit received is bit #1 of FIRST SYNC switch. For code levels of less than 8 bits, the high order bits are ignored. The SYNC pattern entered on these switches can be *any* two-character pattern for HDX operation. However, for FDX operation, two consecutive, identical characters must be used for the SYNC pattern. In addition to the numbers 1 through 8 assigned to character bits, the switches are also numbered in BCD values for operators who are familiar with hexadecimal values of characters and BCD equivalents.

Table 2-3. Internal CRT Controls (see Paragraph 1.4.3).

Control/Indicator	Position/Function
BRIGHTNESS	Adjusts brightness of CRT display to desired intensity.
CONTRAST	Control is adjusted to set desired display contrast.
VERTICAL SIZE	Control is set to provide desired vertical dimension of CRT image area.
VERTICAL LINEARITY	Control is set to produce equal spacing between scan lines from top to bottom of CRT. Characters should be of equal height and spacing at top and bottom of screen.
WIDTH	Control is set to produce the proper width of CRT image area.
HORIZONTAL LINEARITY	Control is set to produce equal character spacing (horizontal scan velocity) throughout total scan length. Character width and spacing should be identical at both the left and right sides of image.
FOCUS	Control is set to produce clearly-defined characters.

Table 2-4. Access Panel Controls and Connectors.

Control/Indicator	Position/Function
AC CONNECTOR	The AC Line Cord is connected to this connector to supply primary AC power to the equipment.
FUSE	Overcurrent protection device, 3.0 amp slow-blow.
115/230 VOLTS	Switch is set to correspond with source of primary power.
VIDEO OUTPUT	Type BNC connector used to supply composite video and sync signal to external display instrument. Signal is 2 volts P/P.
AUXILIARY CONTROL CONNECTOR	50-Pin Amphenol Connector used for control and signal interface from SCM Control Panel.
	In addition to the front panel and access panel controls and indicators, the rack-mounted INTERVIEW II provides the following controls and connectors on the rear panel of the SCM-2 Control Panel. • Primary Power Input Connector (115/120V AC) • Fuse 1 amp • 115-230 Volts Selector Switch • Power On/OFF Switch • 50-pin Interface Connector • 25-pin RS 232/V. 24 AC Signal Input Connector

2.3 CODE SELECTION

2.3.1 General

The operator may choose up to six data codes for translation of any input data. The six codes consist of four standard codes and two optional customer-specified codes. (Refer to Paragraph 1.4.4.)

STANDARD:
ASCII
EBCDIC
SELECTRIC
EBCD

OPTIONS:
BCD and REV BCD
BCD and REV EBCD or
BAUDOT and FIELD DATA or
BAUDOT and REV BCD
BAUDOT and IPARS

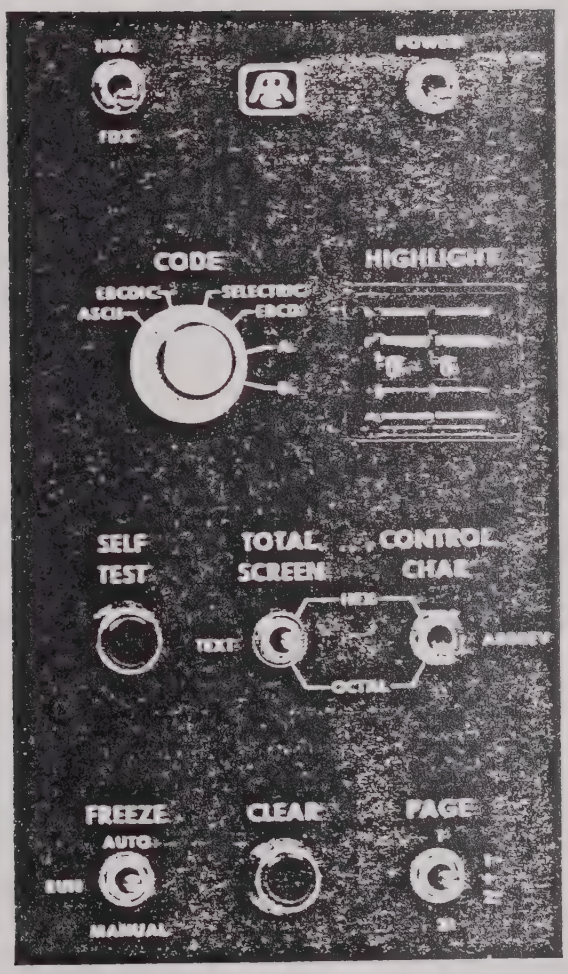


Figure 2-1. INTERVIEW Front Panel Controls.

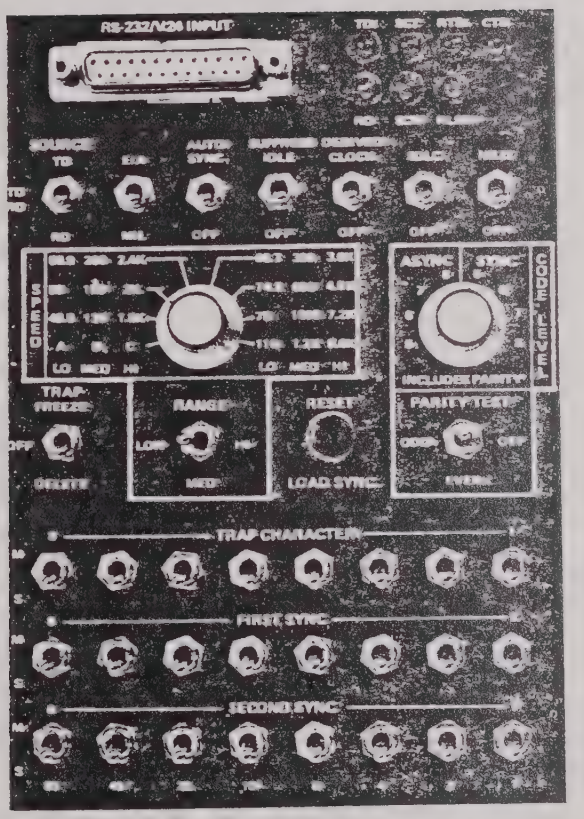


Figure 2-2. SCM-1 Controls and Indicators

Translation for display always follows the conventions of the selected code, regardless of how the input data may be coded. When the CODE selector switch is set to a code which does not correspond with the coding of the input data, the display will be unintelligible. Code translation charts for the above codes are provided in Appendix C of this manual.

2.3.2 Shift Codes

All Shift Codes will display the HOME character on the screen in the "unshift" set. The instrument logic assumes a preceding unshift character until it is updated by the next received "shift" character.

2.4 DISPLAY SYMBOLS AND FORMAT

2.4.1 Display Font

The display font (letter and symbol style) used in the INTERVIEW is the ANSI Standard for a 7-bit code. This symbol set is shown in Figure 2.3. The ASCII code for this set is referenced at the top and side of the set. (The code shown is in order of transmission; i.e., A0 = Least Significant Data Bit.) Each character of the set is composed of a number of dots in a 7- by 9-dot matrix.

2.4.2 Display Format

Data may be displayed by the INTERVIEW by the use of three separate formats: Text, Hexadecimal, and Octal. These formats are described in the following paragraphs.

2.4.2.1 Text Format

When the INTERVIEW is set to display characters in TEXT, the display consists of the character set shown in Figure 2-3. However, in instances where an input character has no defined symbol, the character is displayed in HEXADECIMAL and will blink to alert the operator that an undefined character has been received. In EBCDIC/BI-SYNC, the cursor addressing characters and BCC calculations are included in this category. Examples of TEXT display are shown in the left-hand column of Figure 2-4. The display symbols associated with each of the nine (9) possible input codes are shown in Tables 2-5 through 2-13.

2.4.2.2 Hexadecimal Format

An eight-bit code provides 256 unique combinations which can be displayed as two hexadecimal digits. The INTERVIEW provides a hexadecimal display format of two digits per input character, with the two digits aligned diagonally in one symbol position. Examples of the hexadecimal display format are shown in the center column of Figure 2-4. The hexadecimal equivalents of binary input data are provided in Appendix C of this manual.

2.4.2.3 Octal Format

The 256 unique combinations provided by an 8-bit binary code can also be displayed as three octal digits. When desired, the INTERVIEW provides an octal display of input characters as shown in Figure 2-5. In this format, the symbol position is divided into three (3) sections for the octal representation. The left-hand section of the symbol position is used to display the first (most significant) using a vertical column of up to three dots. The three-dot display capacity provides a choice of four digits (0, 1, 2, 3) as the most significant digit.

The remaining two digits of the octal format are displayed in a vertical column at the right of the symbol position, with the least significatn digit at the bottom (see Figure 2-5).

Examples of the octal display format are shown in the right-hand column of Figure 2-4.

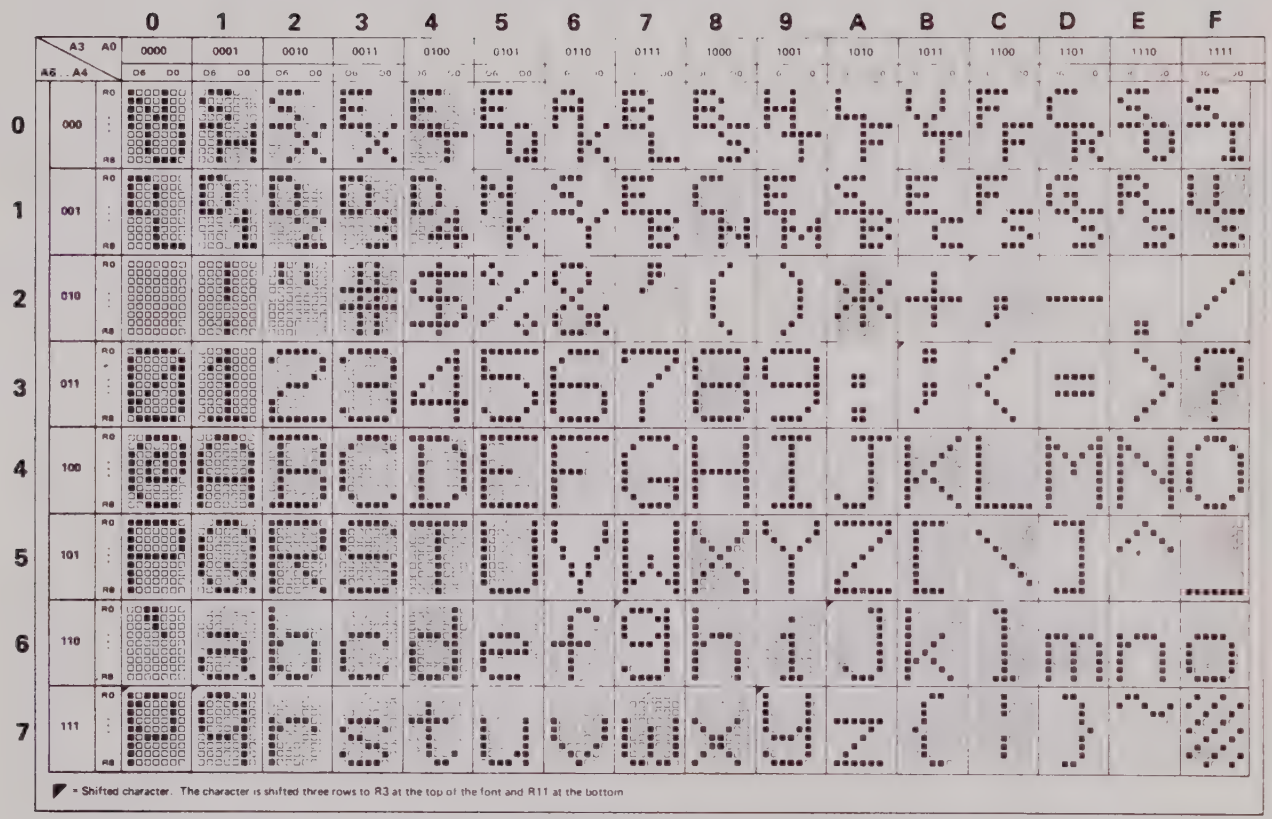
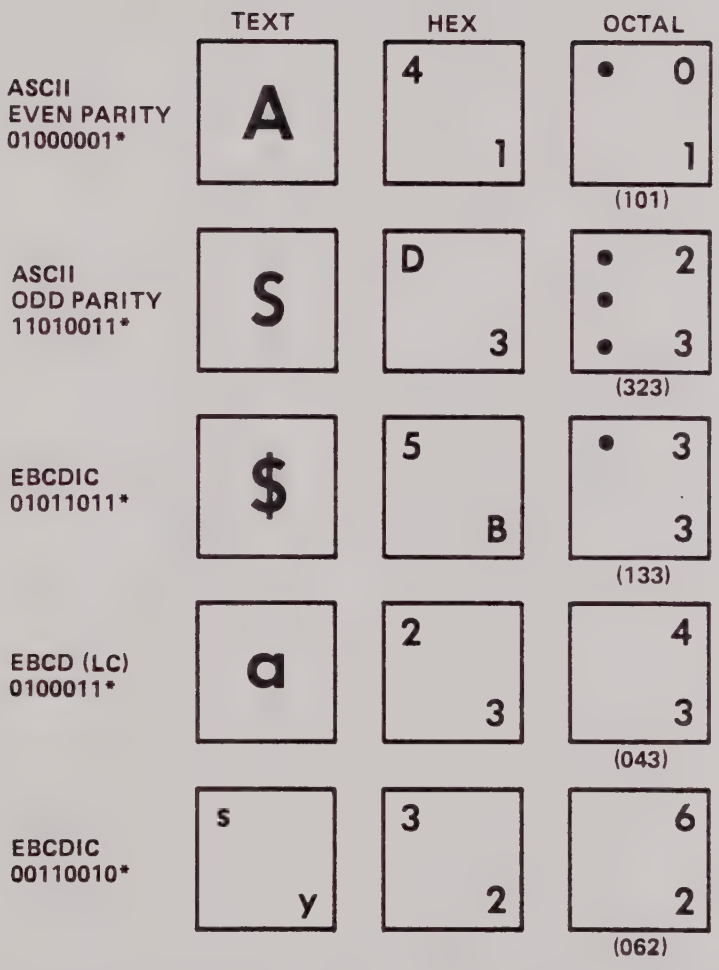


Figure 2-3. 128-Character ANSI Symbol Set for Data Communications Formed in 7 x 9 Dot Matrix Display Format.



*Least Significant Bit (LSB) is on right, and is transmitted (or received) first.

Figure 2-4. Examples of Display Format in Text, Hex and Octal.

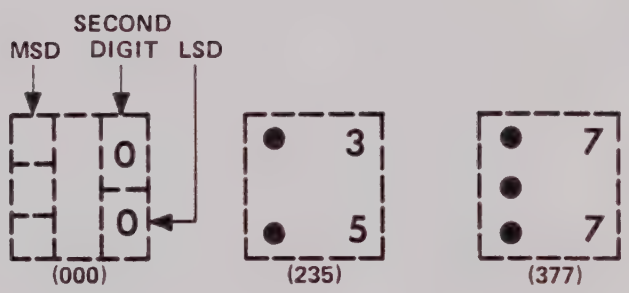


Figure 2-5. Octal Display Format Grouping in Symbol Position.

After SN-291 the following changes are effective:

HEX 07	DISPLAYS	07
60		– (minus)
61		/ (slash)
79		' (accent)
A1		~
EO		\ (reverse slash)

Table 2-5. Input Address and Corresponding Output Display Symbols for EBCDIC Data Code.

HEX ADDR	SYMB.	HEX ADDR	SYMB.	HEX ADDR	SYMB.	HEX ADDR	SYMB.	HEX ADDR	SYMB.	HEX ADDR	SYMB.
00	N_U	30*	3_0	60	–	90*	9_0	C0	{	F0	0
01	S_H	31*	3_1	61	/	91	j	C1	A	F1	1
02	S_X	32	S_Y	62*	6_2	92	k	C2	B	F2	2
03	E_X	33*	3_3	63*	6_3	93	l	C3	C	F3	3
04	0_4	34*	3_4	64*	6_4	94	m	C4	D	F4	4
05	H_T	35*	3_5	65*	6_5	95	n	C5	E	F5	5
06*	0_6	36*	3_6	66*	6_6	96	o	C6	F	F6	6
07	0_7	37	E_T	67*	6_7	97	p	C7	G	F7	7
08*	0_8	38*	3_8	68*	6_8	98	q	C8	H	F8	8
09*	0_9	39*	3_9	69*	6_9	99	r	C9	I	F9	9
0A*	0_A	3A*	3_A	6A	¦	9A*	9_A	CA*	C_A	FA*	F_A
0B	V_T	3B*	3_B	6B	,	9B*	9_B	CB*	C_B	FB*	F_B
0C	F_F	3C	D_4	6C	%	9C*	9_C	CC*	C_C	FC*	F_C
0D	C_R	3D	N_K	6D	–	9D*	9_D	CD*	C_D	FD*	F_D
0E	S_O	3E*	3_E	6E	>	9E*	9_E	CE*	C_E	FE*	F_E
0F	S_I	3F	S_B	6F	?	9F*	9_F	CF*	C_F	FF	▒
10	D_L	40	(SP)	70*	7_0	A0*	A_0	D0	}		
11	D_1	41*	4_1	71*	7_1	A1	~	D1	J		
12	D_2	42*	4_2	72*	7_2	A2	s	D2	K		
13	D_3	43*	4_3	73*	7_3	A3	t	D3	L		
14*	1_4	44*	4_4	74*	7_4	A4	u	D4	M		
15*	1_5	45*	4_5	75*	7_5	A5	v	D5	N		
16	B_5	46*	4_6	76*	7_6	A6	w	D6	O		
17*	1_7	47*	4_7	77*	7_7	A7	x	D7	P		
18	C_N	48*	4_8	78*	7_8	A8	y	D8	Q		
19	E_M	49*	4_9	79	`	A9	z	D9	R		
1A*	1_A	4A*	4_A	7A	:	AA*	A_A	DA*	D_A		
1B*	1_B	4B	.	7B	#	AB*	A_B	DB*	D_B		
1C	F_S	4C	<	7C	@	AC*	A_C	DC*	D_C		
1D	G_S	4D	(	7D	'	AD*	A_D	DD*	D_D		
1E	R_S	4E	+	7E	=	AE*	A_E	DE*	D_E		
1F	U_S	4F*	4_F	7F	"	AF*	A_F	DF*	D_F		
20*	2_0	50	&	80*	8_0	B0*	B_0	E0	\		
21*	2_1	51*	5_1	81	a	B1*	B_1	E1*	E_1		
22*	2_2	52*	5_2	82	b	B2*	B_2	E2	S		
23*	2_3	53*	5_3	83	c	B3*	B_3	E3	T		
24*	2_4	54*	5_4	84	d	B4*	B_4	E4	U		
25	L_F	55*	5_5	85	e	B5*	B_5	E5	V		
26	E_B	56*	5_6	86	f	B6*	B_6	E6	W		
27	E_C	57*	5_7	87	g	B7*	B_7	E7	X		
28*	2_8	58*	5_8	88	h	B8*	B_8	E8	Y		
29*	2_9	59*	5_9	89	i	B9*	B_9	E9	Z		
2A*	2_A	5A	!	8A*	8_A	BA*	B_A	EA*	E_A		
2B*	2_B	5B	$	8B*	8_B	BB*	B_B	EB*	E_B		
2C*	2_C	5C	*	8C*	8_C	BC*	B_C	EC*	E_C		
2D	EQ	5D	)	8D*	8_D	BD*	B_D	ED*	E_D		
2E	AK	5E	;	8E*	8_E	BE*	B_E	EE*	E_E		
2F	BL	5F*	5_F	8F*	8_F	BF*	B_F	EF*	E_F		

*Symbol will be displayed in OCTAL when CONTROL CHARACTER switch is set to OCTAL.

Table 2-6. Input Address and Corresponding Output Display Symbols for ASCII Data Code.

HEX ADDR	SYMB.	HEX ADDR	SYMB.	HEX ADDR	SYMB.	HEX ADDR	SYMB.
00	N_U	20	(SP)	40	@	60	`
01	S_H	21	!	41	A	61	a
02	S_X	22	"	42	B	62	b
03	E_X	23	#	43	C	63	c
04	E_T	24	$	44	D	64	d
05	E_Q	25	%	45	E	65	e
06	A_K	26	&	46	F	66	f
07	B_L	27	'	47	G	67	g
08	B_S	28	(	48	H	68	h
09	H_T	29	)	49	I	69	i
0A	L_F	2A	*	4A	J	6A	j
0B	V_T	2B	+	4B	K	6B	k
0C	F_F	2C	,	4C	L	6C	l
0D	C_R	2D	-	4D	M	6D	m
0E	S_O	2E	.	4E	N	6E	n
0F	S_I	2F	/	4F	O	6F	o
10	D_L	30	Ø	50	P	70	p
11	D_1	31	1	51	Q	71	q
12	D_2	32	2	52	R	72	r
13	D_3	33	3	53	S	73	s
14	D_4	34	4	54	T	74	t
15	N_K	35	5	55	U	75	u
16	S_Y	36	6	56	V	76	v
17	E_B	37	7	57	W	77	w
18	C_N	38	8	58	X	78	x
19	E_M	39	9	59	Y	79	y
1A	S_B	3A	:	5A	Z	7A	z
1B	E_C	3B	;	5B	[	7B	{
1C	F_S	3C	<	5C	/	7C	¦
1D	G_S	3D	=	5D	]	7D	}
1E	R_S	3E	>	5E	^	7E	~
1F	U_S	3F	?	5F	–	7F	⁘

Table 2-7. Input Address and Corresponding Output Display Symbols for EBCD Data Code.

ADDR	OUT LC	OUT UC	ADDR	OUT LC	OUT UC
00	(SP)	(SP)	20	1	=
01	–	–	21	j	J
02	@	0_2*	22	^	?
03	&	+	23	a	A
04	8	*	24	9	(
05	q	Q	25	r	R
06	y	Y	26	z	Z
07	h	H	27	i	I
08	4	:	28	5	%
09	m	M	29	n	N
0A	u	U	2A	v	V
0B	d	D	2B	e	E
0C*	D_2	D_2	2C*	R_S	R_S
0D*	0_D	0_D	2D*	C_R	C_R
0E*	0_E	0_E	2E*	L_F	L_F
0F*	D_4	D_4	2F*	H_T	H_T
10	2	<	30	3	;
11	k	K	31	ℓ	L
12	s	S	32	t	T
13	b	B	33	c	C
14	ϕ	)	34	#	"
15	#	#①	35	$	!
16	.	.①	36	,	3_6*
17*	1_7	1_7	37	.	^
18	6	'	38	7	>
19	o	O	39	p	P
1A	w	W	3A	x	X
1B	f	F	3B	g	G
1C*	^	^ ②	3C*	E_T	E_T
1D*	B_S	B_S	3D*	S_Y	S_Y
1E*	1_E	1_E	3E*	S_H	S_H
1F*	\	\ ③	3F*	⁘	⁘

NOTES: ① These characters are undefined in EBCD. The INTERVIEW uses these two characters to generate the fill symbols in FDX.

② UPSHIFT.

③ DOWNSHIFT.

*Characters will be displayed in OCTAL when CONTROL CHARACTER switch is set to OCTAL.

Table 2-8. Input Address and Corresponding Output Display Symbols for SELECTRIC Data Code.

HEX ADDR	SYMBOL		HEX ADDR	SYMBOL	
	LC	UC		LC	UC
00	(SP)	(SP)	20	1	N_U
01	!	0_1*	21	m	M
02	t	T	22	x	X
03	j	J	23	g	G
04	4	$	24	ϕ	)
05	o	O	25	s	S
06	ℓ	L	26	h	H
07	/	?	27	y	V
08	5	%	28	7	&
09	'	"	29	r	R
0A	e	E	2A	d	D
0B	p	P	2B	;	:
0C*	D_2	D_2	2C*	R_S	R_S
0D*	0_D	0_D	2D*	C_R	C_R
0E*	0_E	0_E	2E*	L_F	L_F
0F*	D_4	D_4	2F*	H_T	H_T
10	2	@	30	3	#
11	.	.	31	v	V
12	n	N	32	u	U
13	=	+	33	f	F
14	z	Z	34	9	(
15	#	#①	35	w	W
16*	1_6	1_6	36	b	B
17*	1_7	1_7	37	-	-
18	6	1_8*	38	8	*
19	i	I	39	a	A
1A	k	K	3A	c	C
1B	q	Q	3B	,	,
1C*	^	^ ②	3C*	E_T	E_T
1D*	B_S	B_S	3D*	S_Y	S_Y
1E*	1_E	1_E	3E*	S_H	S_H
1F*	\	\ ③	3F*	⁘	⁘

NOTES: ① This character is undefined in SELECTRIC. The INTERVIEW can use this character to generate the fill symbols for FDX.

② UPSHIFT.

③ DOWNSHIFT.

*Characters will be displayed in OCTAL when CONTROL CHARACTER switch is set to OCTAL.

Table 2-9. Input Address and Corresponding Output Display Symbols for BAUDOT Data Code.

HEX ADDR	SYMB		HEX ADDR	SYMB	
	FIGS	LTRS		FIGS	LTRS
00	0_0	0_0	10	5	T
01	3	E	11	"	Z
02	L_F	L_F	12	)	L
03	-	A	13	2	W
04	0_4	(SP)	14	#	H
05	0_5	S	15	6	Y
06	8	I	16	ϕ	P
07	7	U	17	1	Q
08	C_R	C_R	18	9	O
09	$	D	19	?	B
0A	4	R	1A	8	G
0B	'	J	1B	^	^ ①
0C	,	N	1C	.	M
0D	!	F	1D	/	X
0E	:	C	1E	;	V
0F	(	K	1F	\	\ ②

NOTES: ① UPSHIFT to figures.

② DOWNSHIFT to letters.

Table 2-10. Input Address and Corresponding Output Display Symbols for FIELD Data Code.

HEX ADDR	SYMB	HEX ADDR	SYMB	HEX ADDR	SYMB	HEX ADDR	SYMB
00	0_0	10	K	20	)	30	ϕ
01	&	11	L	21	-	31	1
02	^	12	M	22	+	32	2
03	[	13	N	23	<	33	3
04	]	14	O	24	=	34	4
05	(SP)	15	P	25	>	35	5
06	A	16	Q	26	#	36	6
07	B	17	R	27	$	37	7
08	C	18	S	28	*	38	8
09	D	19	T	29	(	39	9
0A	E	1A	U	2A	%	3A	'
0B	F	1B	V	2B	:	3B	;
0C	G	1C	W	2C	?	3C	/
0D	H	1D	X	2D	!	3D	.
0E	I	1E	Y	2E	,	3E	F_F
0F	J	1F	Z	2F	@	3F	C_R

Table 2-11. Input Address and Corresponding Output Display Symbols for REVERSE EBCD Data Code.

HEX ADDR	SYMB		HEX ADDR	SYMB	
	LC	UC		LC	UC
00	(SP)	(SP)	20	-	-
01	1	=	21	j	J
02	2	<	22	k	K
03	3	;	23	l	L
04	4	:	24	m	M
05	5	%	25	n	N
06	6	'	26	o	O
07	7	>	27	p	P
08	8	*	28	q	Q
09	9	(	29	r	R
0A	ϕ	)	2A	#①	#①
0B	#	"	2B	$	!
0C	[	]	2C	\	^
0D*	F_F	F_F	2D*	C_R	C_R
0E*	^	^②	2E*	B_S	B_S
0F*	0_F	0_F	2F*	2_F	2_F
10	@	1_0	30	&	+
11	/	?	31	a	A
12	s	S	32	b	B
13	t	T	33	c	C
14	u	U	34	d	D
15	v	V	35	e	E
16	w	W	36	f	F
17	x	X	37	g	G
18	y	Y	38	h	H
19	z	Z	39	i	I
1A	.①	.①	3A*	3_A	3_A
1B	,	1_B*	3B*	.	3_B
1C	}	{	3C	~	`
1D*	1_D	1_D	3D*	3_D	3_D
1E*	1_E	1_E	3E*	\	\③
1F*	1_F	1_F	3F*	3_F	3_F

NOTES:
① These characters are undefined in REVERSE EBCD. The INTERVIEW uses these characters to generate the fill symbols for FDX.
② UPSHIFT
③ DOWNSHIFT

*Characters will be displayed in OCTAL when CONTROL CHARACTER switch is set to OCTAL.

Table 2-12. Input Address and Corresponding Output Display Symbols for REVERSE BCD Data Code.

HEX ADDR	SYMB		HEX ADDR	SYMB	
	LC	UC		LC	UC
00	(SP)	(SP)	20	-	-
01	1	=	21	j	J
02	2	0_2*	22	k	K
03	3	;	23	l	L
04	4	:	24	m	M
05	5	%	25	n	N
06	6	'	26	o	O
07	7	"	27	p	P
08	8	*	28	q	Q
09	9	(	29	r	R
0A	ϕ	)	2A	#①	#①
0B	'	0_B*	2B	$	!
0C*	0_C	0_C	2C*	2_C	2_C
0D*	R_S	R_S	2D*	C_R	C_R
0E*	^	^ ②	2E*	B_S	B_S
0F*	E_T	E_T	2F*	2_F	2_F
10	@	1_0	30	&	+
11	/	?	31	a	A
12	s	S	32	b	B
13	t	T	33	c	C
14	u	U	34	d	D
15	v	V	35	e	E
16	w	W	36	f	F
17	x	X	37	g	G
18	y	Y	38	h	H
19	z	Z	39	i	I
1A*	1_A	1_A	3A*	3_A	3_A
1B	1_B*	,	3B	.	.
1C*	1_C	1_C	3C*	3_C	3_C
1D*	L_F	L_F	3D*	H_T	H_T
1E*	1_E	1_E	3E*	\	\ ③
1F*	1_F	1_F	3F*	⁘	⁘

NOTES:
① This character is actually undefined in REV BCD. The INTERVIEW uses this character to generate one of the fill symbols for FDX.
② UPSHIFT
③ DOWNSHIFT

*Characters will be displayed in OCTAL when CONTROL CHARACTER switch is set to OCTAL.

Table 2-13. Input Address and Corresponding Output Symbols for IPARS Data Code.

HEX INPUT	BCD LINE CODE 1248AB	SYMBOL	HEX INPUT	BCD LINE CODE 1248AB	SYMBOL
ØØ	ØØØØØØ	0_0	2Ø	1ØØØØØ	1
Ø1	ØØØØØ1	@	21	1ØØØØ1	J
Ø2	ØØØØ1Ø	0_2	22	1ØØØ1Ø	/
Ø3	ØØØØ11	$	23	1ØØØ11	A
Ø4	ØØØ1ØØ	8	24	1ØØ1ØØ	9
Ø5	ØØØ1Ø1	Q	25	1ØØ1Ø1	R
Ø6	ØØØ11Ø	Y	26	1ØØ11Ø	Z
Ø7	ØØØ111	H	27	1ØØ111	I
Ø8	ØØ1ØØØ	4	28	1Ø1ØØØ	5
Ø9	ØØ1ØØ1	M	29	1Ø1ØØ1	N
ØA	ØØ1Ø1Ø	U	2A	1Ø1Ø1Ø	V
ØB	ØØ1Ø11	D	2B	1Ø1Ø11	E
ØC	ØØ11ØØ	]	2C	1Ø11ØØ	-
ØD	ØØ11Ø1	+	2D	1Ø11Ø1	2_D
ØE	ØØ111Ø	SP	2E	1Ø111Ø	2_E
ØF	ØØ1111	%	2F	1Ø1111	2_F
1Ø	Ø1ØØØØ	2	3Ø	11ØØØØ	3
11	Ø1ØØØ1	K	31	11ØØØ1	L
12	Ø1ØØ1Ø	S	32	11ØØ1Ø	T
13	Ø1ØØ11	B	33	11ØØ11	C
14	Ø1Ø1ØØ	Ø	34	11Ø1ØØ	*
15	Ø1Ø1Ø1	:	35	11Ø1Ø1	<
16	Ø1Ø11Ø	-	36	11Ø11Ø	#
17	Ø1Ø111	?	37	11Ø111	.
18	Ø11ØØØ	6	38	111ØØØ	7
19	Ø11ØØ1	0	39	111ØØ1	P
1A	Ø11Ø1Ø	W	3A	111Ø1Ø	X
1B	Ø11Ø11	F	3B	111Ø11	G
1C	Ø111ØØ	=	3C	1111ØØ	3_C
1D	Ø111Ø1	)	3D	1111Ø1	(
1E	Ø1111Ø	[	3E	11111Ø	,
1F	Ø11111	"	3F	111111	3_F

2.5 TYPICAL OPERATION

2.5.1 Set-Up for Testing

Setting up the INTERVIEW II for a typical testing configuration is performed in steps as follows:

STEP 1: Make certain that the 115/230-volt power selection switch on the access panel is set to the proper voltage setting. Connect AC power cord to power source.

STEP 2: Connect control cable from SCM-1 to 50-pin connector on access panel of INTERVIEW.

STEP 3: Insert the test cable supplied with the INTERVIEW II into the RS-232/V.24 connector on the SCM-1 Module. Use cable connector with longest cable leg.

STEP 4: Disconnect communications line to be tested at any EIA Interface in circuit.

WARNING

Make certain that line to be tested is not carrying data traffic when circuit is broken.

STEP 5: Use the short leg of the test cable to bridge the communications line. This provides continuity through the communications line, and provides a parallel "T" connection to the INTERVIEW II.

STEP 6: Energize the INTERVIEW II. Set up controls as desired, using Table 2-1 and Table 2-2 as references.

NOTE

When EIA patch fields are available for circuit testing, a test connection may be made directly from the INTERVIEW II to the appropriate test/monitor connector on the patch field.

2.5.2 Operating Notes

FDX OPERATION — When displaying synchronous full-duplex data, it is necessary that the system under test use a protocol which requires two consecutive, identical SYNC characters. The FIRST SYNC switches on the INTERVIEW II must be set for this character pattern.

The TD-TD/RD-RD switch on the SCM-1 Module must be set to either TD or RD positions to determine top (high intensity) line and subsequent alternate lines of the display. The TRAP CHARACTER feature of the INTERVIEW II will respond *only* to characters in the high-intensity lines, which show the primary (TD or RD) path selected.

HDX OPERATION – Any two-character SYNC pattern may be selected for half-duplex operation, to accommodate protocols which use such SYNC patterns. In HDX, the TRAP CHARACTER (Freeze-Delete) function will respond to any character displayed.

AUTO SYNC – Auto Sync provides a continuous search of data for a sync pattern, even though the pattern may be skewed by a number of bits less than one character. It is therefore advisable to disable the AUTO SYNC feature when a protocol is used which permits consecutive data characters which can be interpreted as skewed sync patterns.

APPENDIX A

MODIFICATIONS REQUIRED FOR IMPLEMENTATION OF OPTIONAL CODES A & B TRANSLATION CAPABILITY

A-1 GENERAL

The information in this Appendix contains instructions for performing the required modifications for implementing translation of Optional Codes A and B. The procedure requires the addition of five (5) PROM modules, and the installation of plug in straps on the circuit board.

A-2 VALID COMBINATIONS

A-2.1 A and B USED AS TWO 6-BIT CODES

In this configuration, Codes A and B are used as two separate 6-bit (or less) codes which use "shift" and "unshift" characters to produce Upper/Lower case, or Figures/Letters, using 64 code patterns to generate 128 character symbols.

Examples of this combination are codes such as BAUDOT (5 data bits, 32 code patterns, 64 character symbols), EBCD, and SELECTRIC (6 data bits, 64 code patterns, 128 character symbols). This type of combination is available installed at the time of manufacture, as listed in Section I (General Information) of this manual. Code translation options 1 through 5 are all included in this category.

A-2.2 A and B USED AS TWO 7-BIT CODES

In this configuration, Codes A and B are used as two separate 7-bit codes which each produce 128 character symbols. An example of such a code is ASCII (7 bits, no parity).

A-2.3 A and B USED AS ONE 8-BIT CODE

In this configuration, Codes A and B are combined to form one 8-bit code, such as EBCDIC, to produce 256 character symbols.

A-3 STRAP INSTALLATION

Table A-1 shows the straps which must be installed for each of the valid code combinations outlined in Paragraph A-2. The table also shows the strapping necessary for generation of fill characters for FDX Idle Symbols. The location of these straps are shown in Figures A-1 and A-2.

NOTE

ONLY TWO STRAPS ARE USED FOR ANY ONE COMBINATION.

Table A-1. Strapping Requirements for Code A/B Combinations.

Strap Location	Function	Par. A-2.1	Par. A-2.2	Par. A-2.3
A D1-D27	Code A/B	64 CH. SHFT	128 CH.	–
B D2-D28	Code A/B	64 CH. SHFT	–	–
C D3-D29	Code A/B	–	–	256 CH.
D D4-D30	Code A/B	–	128 CH.	256 CH.
E D5-D31	FDX FILL SYMBOL (#)			
F D6-D32	FDX FILL SYMBOL (.)			

A-4 PROM MODULE INSTALLATION

A-4.1 MODULES INVOLVED

The following modules are involved in the implementation procedure and are shown in Figure A-2:

PROM MODULE	FUNCTION
860 M	Control Character Detect
860 O	Translate High-Order Bits
860 P	Translate Low-Order Bits
860 E	Shift Detect
860 D	Clear/Symbol

A-4.2 INSTALLATION PROCEDURE

Modules are installed in steps as follows:

STEP 1. Install PROM 860 M with Pin 1 at DF10

STEP 2. Install PROM 860 O with Pin 1 at DH10

STEP 3. Install PROM 860 P with Pin 1 at DH19.

STEP 4. Replace existing PROM 860 D with new module with Pin 1 at BB46.

STEP 5. When implementation of Codes A and B is performed to use two separate 6-bit (or less) codes, as outlined in Paragraph A-2.1, the existing PROM 860 E is replaced with a new module, with Pin 1 positioned at DH28.

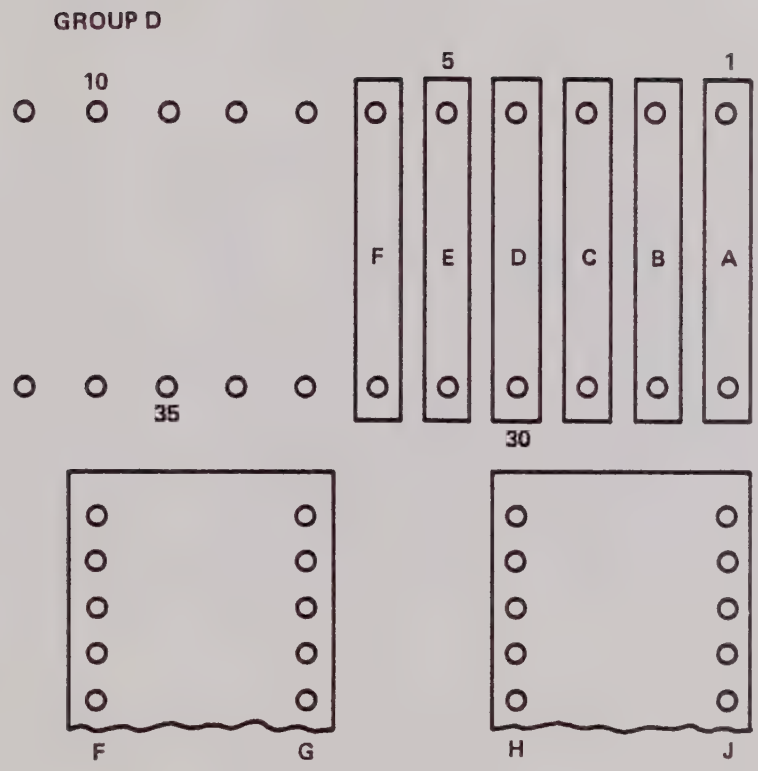


Figure A-1. Location of Strapping on Circuit Board.

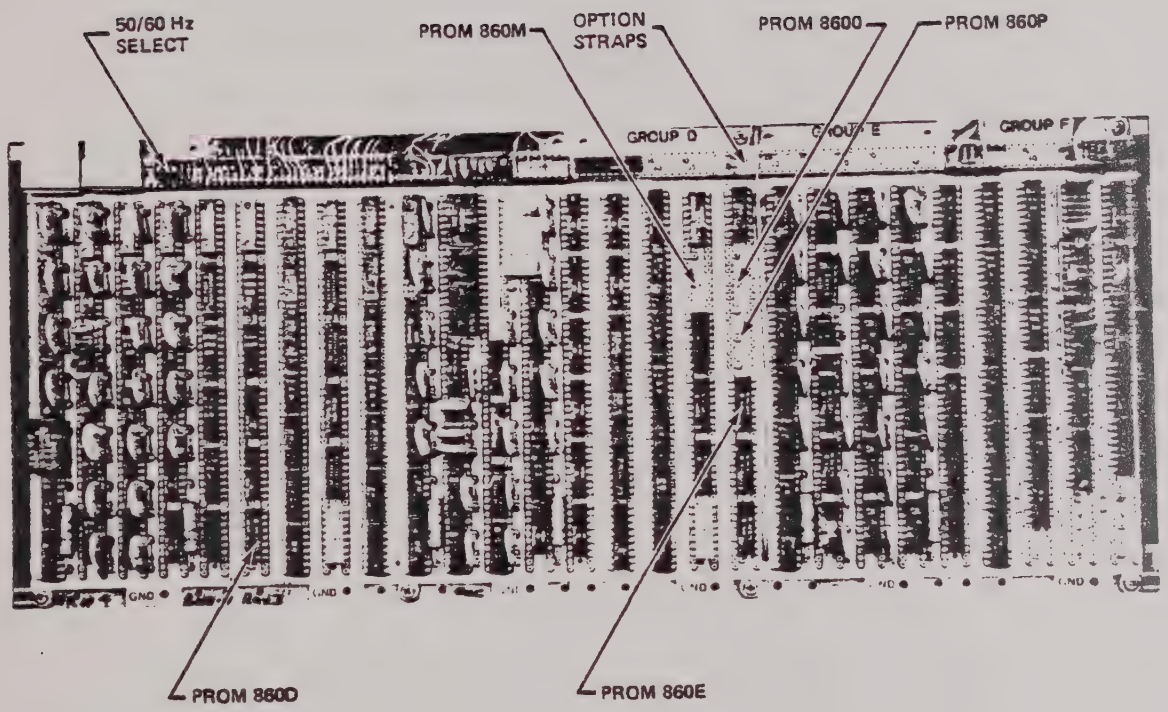


Figure A-2. Circuit Board Assembly.

APPENDIX B

INTERSHAKE FUNCTION LIST AND TEST AID

INTERSHAKE II FUNCTION LIST

THESE FUNCTIONS CAN BE COMBINED IN ANY ORDER TO SIMULATE OR TEST DATA COMMUNICATION SYSTEMS AND EQUIPMENT.

NOTE: The "Bit Entry Method" shown in the following Table is All Space, Mark/Space, BCD, Binary or "XY". No method is shown where a language character is to be entered. When a character must be entered, the user should utilize the method familiar to him, i.e., HEX, Octal, Bit Switch arrangement, etc.

	LOAD INTO MEMORY						READ OUTCOME IN RESULTS MEMORY (when applicable)		
GROUP	FUNCTION	DESCRIPTION	ENTER	BIT ENTRY METHOD	BIT SWITCH 8765 POSITION	BIT SWITCH 4321 POSITION	DATA HEX DISPLAY (Range)	DATA HEX DISPLAY (Range)	ITEM REPRESENTED	FUNCTION
HALT	00	Stop Program, Operate Step To Continue	00	All Space	SSSS	SSSS	00	-	-	-
MONITOR	01	Start Character Search	00	All Space	SSSS	SSSS	00	-	-	-
	02	Trap Characters On TD Only	Character				00-FF	00-FF	Character	02
	03	Trap Characters On RD Only	"				"	"	"	03
	04	Trap Characters On TD or RD	"				"	"	"	02(TD) or 03(RD)
	05	End Character Search	00	All Space	SSSS	SSSS	00	"	"	-
RECORD	07	Record Bit Switch Arrangement Entered	Desired Tab Mark	Mark/Space	As Desired		00-FF	00-FF	Tab Mark/Space	07
	08	Record Loop "L" Count (See Fun 42 & 43)	00	All Space	SSSS	SSSS	00	00-0F	No. of Loops (in BCD)	08
	09	Record Interrupt Step	"	"	"	"	"	00-FF	Step (in Binary)	09
RECEIVE	#10	Wait Until TD/RD Change	00	All Space	SSSS	SSSS	00	-	-	-
	#11	Record Until TD/RD Change	"	"	"	"	"	00-FF	Character (Continues until TD/RD change)	11
	12	Record TD/RD and RS-232(V.24) Status	"	"	"	"	"	"	8 7 6 5 4 3 2 1 RTS CTS DSR RLSD DTR RI (7X) DETECT TP AUX DETECT NOTE MARK (ON) = ACTIVE SPACE (OFF) = INACTIVE	02(TD) or 03(RD)
INDEX	#13	Time Out or TD/RD Change	01-99 (for 0.1 to 9.9 Sec.)	BCD	80 40 20 10	8 4 2 1	01-99	-	-	-
	14	Wait N Received Characters	No. of Characters	"	"	"	"	-	-	-
	15	Wait To Complete Transmit Character (Must be used with Function 57 when in synchronous operation)	00	All Space	SSSS	SSSS	00	-	-	-
	16	Wait Until = Character	Character				00-FF	-	-	-
	17	Wait Until ≠ Character	"				"	-	-	-
	19	Enter Interrupt Character (Enable with Function 97 (03))	"				"	-	-	-
	#	The Test Selector Switch must be in the TD/RD position.								
TRAP	20	Trap Character	Character				00-FF	00-FF	Character	20
	21	Trap First Character in Sequence	"				"	"	"	21
	22	Trap Middle Character(s) in Sequence	"				"	"	" (Continues until Trap Last Character)	22
	23	Trap Last Character in Sequence	"				"	00-FF	Character	23
RECORD	25	Record Until Trap Character	Trap Character				"	"	Any Character (Continues until Trap Character)	25
								00-FF	Trap Character	25
	26	Record Next ≠ Character	= Character				"	"	≠ Character	26
	30	Record Next Character	00	All Space	SSSS	SSSS	00	00-FF	Character	30
	31	Record Character N	Character No.	BCD			01-99	"	"	31
	32	Record N Characters	No. of Characters	"	"	"	"	"	" (Continues until Nth Character is recorded)	32
	33	Record Character Before Trap	Trap Character				00-FF	00-FF	Character -1	33
	°34	Jump and Record PE	00	All Space	SSSS	SSSS	00	"	PE Character	34
	°35	Record Latch Mode								
		Normal OFF	00	All Space	SSSS	SSSS	00	-	-	-
		Record Receive Data	01	BCD	"	SSSM	01	00-FF	Character (Continues until turned OFF by 35(00)	Undefined
		Self Monitor	02	"	"	SSMS	02	-	-	-
		Record All Transmit Data	03	"	"	SSMM	03	00-FF	Character (Continues until turned OFF by 35(00)	Undefined
	36	Record Current Character	00	All Space	"	SSSS	00	00-FF	Character	36
	*	Preceded by Function 41 for Jump Instruction.								
	°	This Function is latched into Memory and must be restored to Normal OFF (00) at the point in the program sequence where it is desired that subsequent Functions not be effected.								

INTERSHAKE II FUNCTION LIST

(Continued)

LOAD INTO MEMORY							READ OUTCOME IN RESULTS MEMORY (when applicable)		
GROUP	FUNCTION	DESCRIPTION	ENTER	BIT ENTRY METHOD	BIT SWITCH 8765 4321 POSITION		DATA HEX DISPLAY (Range)	DATA HEX DISPLAY (Range)	ITEM REPRESENTED	FUNCTI
					X	Y				
RECEIVE (cont'd)		Define "X" for:			8 4 2 1	8 4 2 1				
		Normal calculation of CRC and EVEN LRC	0-		SSSS		00-08			
		Inverted data for calculation of CRC and ODD	1-		SSSM		10-18			
		Define "Y" for:								
		EBCDIC/CRC-16	-0			SSSS	00 or 10			
		CRC-16 Reverse	-1			SSSM	01 or 11			
		Old IBM	-2			SSMS	02 or 12			
		CRC-12	-3			SSMM	03 or 13			
		CCITT/SDLC-CRC	-6			SMMS	06 or 16			
		CCITT/CRC Reverse	-7			SMMM	07 or 17			
		LRC (6, 7, 8 Level)	-8			MSSS	08 or 18			
RECEIVE BCC	*39	Jump If = BCC Error								
		Jump on Error	00	BCD	SSSS	SSSS	00			
		Jump and Record on Error	01	"	"	SSSM	01	00-FF	LRC Character	39
								or		
	*	Preceded by Function 41 for Jump Instruction.						00-FF	CRC_1 Character	39
								00-FF	CRC_2 Character	39
								NOTE Results Memory is not applicable for Functions 40 through 99 (except for 89) However, this column space is continued for the purpose of REMARKS AND USERS NOTES		
JUMP AND TEST	40	Unconditional Jump to Program Step XY	Step No.	Binary	128 64 32 16	8 4 2 1	00-FF	Binary Address 0-255		
	41	Preset to Instruct Subsequent "Jump(s)" to Jump to Step "XY"		"	"	"	"	Binary Address 0-255		
	42	Repeat (Loop) "L" Times	No. of Loops	BCD	80 40 20 10	8 4 2 1	01-99			
	*43	Jump Until "L" Loops	00	All Space	SSSS	SSSS	00	Functions 43 through 47 must be preceded by Function 41 for "Jump To" Instructions		
	*44	Jump If = Character	Character				00-FF			
	*45	Jump If ≠ Character	"				"			
	*46	Retest and Jump If = Character	"				"			
	*47	Flags: Set and Jump		XY	X	Y				
		Define "X" for:								
		Eight Settable and Testable Flags	0-		SSSS		00-03	The "X" digit is used to select Flag 0 through Flag 7 All Flags are reset cleared to "0" by the start switch Once selected, the Flag is set or tested as determined by the "Y" digits 0, 1, 2 or 3 (see below)		
			1-		SSSM		10-13			
			2-		SSMS		20-23			
			3-		SSMM		30-33			
			4-		SMSS		40-43			
			5-		SMSM		50-53			
			6-		SMMS		60-63			
			7-		SMMM		70-73			
		Define "Y" for:								
		Eight Selectable and Testable Flags								
		Set Flag to 0	-0			SSSS	00-70	All "Y" digits 1 through 3 are applicable to "X" digits 1 through 7		
		Set Flag to 1	-1			SSSM	01-71			
		Jump If = 0	-2			SSMS	02-72			
		Jump If = 1	-3			SSMM	03-73			
		Define "X" for:								
		Internal Signals (Jump Only)								
		Memory Overflow	8-		MSSS		82,83	The "X" digit selects one of eight fixed assigned signals Once selected, the Flag is provided Jump Instructions as determined by the "Y" digits 2 and 3 (see below)		
		Parity Error	9-		MSSM		92,93			
		Overflow Counter (on Front Panel)	A-		MSMS		A2,A3			
		END Counter (on Front Panel)	B-		MSMM		B2,B3			
		Timeout (Function 84 Presets Timer)	C-		MMSS		C2,C3			
		Out of Sync	D-		MMSM		D2,D3			
		Frame Detect (SDLC)	E-		MMMS		E2,E3			
		SDLC BCC Error	F-		MMMM		F2,F3			
		Define "Y" for:								
		Internal Signals (Jump Only)								
		Jump If = 0	-2			SSMS	02-F2	Only the "Y" digits 2 and 3 are applicable to "X" digits 8 through F		
		Jump If = 1	-3			SSMM	03-F3			
	*	Functions 43 through 47 must be preceded by Function 41 for Jump Instructions.								

INTERSHAKE II FUNCTION LIST

(Continued)

LOAD INTO MEMORY								REMARKS AND USERS NOTES
GROUP	FUNCTION	DESCRIPTION	ENTER	BIT ENTRY METHOD	BIT SWITCH 8765 POSITION	4321 POSITION	DATA HEX DISPLAY (Range)	
RESULTS MEMORY	48	Select Results Memory Step	Step No.	Binary	126 64 32 16	8 4 2 1	00-3F	Binary Address 0-63
	49	Select Results Memory Page and Step 00	Page No.	"	SSSS	"	00-0F	Binary Address 0-15
TRANSMIT SEND DATA	50	Send Character	Character				00-FF	
	51	Send a Progression		XY	X 8 4 2 1	Y		Must be used in a program containing a loop using Functions 41, 42 and 43 in order to generate the incrementing action.
		High order "X" digit bits are used to position the sequence in the alpha or numeric field of the desired code. The amount of Progression is obtained from incrementing action provided by Functions 41, 42 and 43.	0-F for "X" All Space for "Y"		"	SSSS	00-FF	Although "All Space" is set in for the low order "Y" digits, the information actually transmitted for "Y" is a Hex ("Y") representation of the increment number obtained from the Loop Counter, Function 43.
SEND FROM RM	52	Send Single Results Memory (RM) Character	00	All Space	SSSS	SSSS	00	Functions 52, 53 and 54 are normally used with Functions 48 and 49.
	53	Send from RM including Trap Character	Trap Character				00-FF	
	54	Send from RM until Trap Function	00-99	BCD	80 40 20 10	8 4 2 1	00-99	Also, Function 68.
SEND MODE	°55	Mode: Echo/Mark/Space						
		Normal OFF	00	BCD	SSSS	SSSS	00	
		Send Steady Mark	01	"	"	SSSM	01	
		Send Steady Space	02	"	"	SSMS	02	
		Echo Mode	04	"	"	SMSS	04	Receive data is transmitted with one bit delay
	°56	Parity Bit Mode						
		Normal OFF	00	"	"	SSSS	00	
		Invert Parity Bit	01	"	"	SSSM	01	
		Parity Bit Mark	02	"	"	SSMS	02	
		Parity Bit Space	03	"	"	SSMM	03	
	57	Load Fill Character	Fill Character				00-FF	
	°	This Function is latched into Memory and must be restored to normal OFF (00) at the point in the program sequence where it is desired that subsequent Functions not be effected.						
SEND BCC	58	Start BCC		XY	X	Y		
		Define "X" for:						
		Normal calculation of CRC and EVEN LRC	0-		SSSS		00-08	Function 59 (below Function 58) will send one character for LRC and two characters for CRC as determined by Function 58
		Inverted data for calculation of CRC and ODD LRC.	1-		SSSM		10-18	
		Define "Y" for:						
		EBCDIC/CRC-16 (ASCII SYNC)	-0			SSSS	00 or 10	When sending CRC, Function 57 is used prior to Function 59 to select a fill character after the second CRC character.
		CRC-16 Reverse	-1			SSSM	01 or 10	
		IBM Special	-2			SSMS	02 or 12	
		CRC-12	-3			SSMM	03 or 13	Function 59 must be the next step after the last character to be included in the calculation.
		CCITT/SDLC-CRC	-6			SMMS	06 or 16	
		CCITT/CRC Reverse	-7			SMMM	07 or 17	
		LRC (6, 7, 8 Level)	-8			MSSS	08 or 18	
	59	Send BCC (Must be preceded by Function 57 when in synchronous operation)	00	All Space	SSSS	SSSS	00	If Idle Mark is to follow BCC, use Function 55 next after Function 59.
SEND MSG/FOX MSG			No. of Characters Total	Print				Applications:
	60	Send ASCII Fox	74	72	Times Sent	BCD	80 40 20 10 8 4 2 1	01-99 TTY Model 33, 35, 37
	61	" ASCII Msg	82	80	"	"	"	" IBM 2260 CRT
	62	" ASCII "	124	122	"	"	"	" IBM 2260 Printer & TTY Wide Platen #38
	63	" EBCDIC "	82	80	"	"	"	" IBM 3270 CRT
	64	" EBCDIC "	124	122	"	"	"	" IBM 3270 Printer
	65	" EBCD "	127	122	"	"	"	" IBM 2740 Printer
	66	" SELECTRIC "	127	122	"	"	"	" 2741 Printer
	67	" BAUDOT Fox	77	72	"	"	"	" EARLIER TTY MODELS
		BCD, Field Data and Reverse Codes are available on Special Order.						

INTERSHAKE II FUNCTION LIST

(Continued)

GROUP	FUNCTION	DESCRIPTION	LOAD INTO MEMORY: ENTER	BIT ENTRY METHOD	BIT SWITCH 8765 4321 POSITION		DATA HEX DISPLAY (Range)	REMARKS AND USERS NOTES
TRANSMIT (Cont'd)	°68	Code Translate Mode		XY	X	Y		Must be followed by Function 52 or 53
		Define "X" for:			8421	8421		
		Disable Function 68	00		SSSS	SSSS	00	
		Results Memory (RM) to HEX ASCII	10		SSSM	"	10	
		RM to CODE selected by "Y"	2-		SSMS		20-27	Entries 20 through 27 convert from one
		RM to HEX EBCDIC (Y=2), HEX EBCD (Y=5) and HEX SELECTRIC (Y=7)	3-		SSMM		32-37	language text to another language text
CODE TRANSLATE		Define "Y" for:						
		EBCDIC to ASCII	-0			SSSS	20	
		ASCII to EBCDIC	-2			SSMS	22, 32	Entries 32, 35 and 37 convert Results Memor
		EBCD to ASCII	-4			SMSS	24	to HEX EBCDIC, HEX EBCD and
		ASCII to EBCD	-5			SMSM	25, 35	HEX SELECTRIC.
		SELECTRIC to ASCII	-6			SMMS	26	
		ASCII to SELECTRIC	-7			SMMM	27, 37	
		Other Translations are available on Special Order.						
	¤	This Function is latched into Memory and must be restored to Normal (disable) (00) at the point in the program sequence where it is desired that subsequent Functions not be effected.						
RS232/ V.24 CONTROLS AND DECISIONS					80 40 20 10	8421		
					RTS CTS DSR RLSD DTR RI	(7X) TEST POINT AUDIBLE ALARM		
			MARK/SPACE	MARK=ON/ SPACE=OFF	8765432	1		For Functions 70 and 71, Bit 1 controls the
	70	Turn ON Leads	Any Lead	"	One or More		00-FF	Audible Alarm.
	71	Turn OFF Leads	"	"	"		"	Bit 2 controls the test point output CONTRO
	72	Wait Until Lead ON	"	"	First of Any		"	OUT (7X)
	73	Wait Until Lead OFF	"	"	"		"	For Functions 72 through 78, Bit 1 is used to
	74	Interrupt if Lead ON	Any One	"	Any One Lead		01-80	sense status of AUX DET devices (e.g., CRT)
	75	Interrupt if Lead OFF	"	"	"		"	Bit 2 detects the input to DETECT IN (7X)
	76	Cancel Interrupt 74 and 75	00	"	All Space		00	
	*77	Jump if ON	Any One	"	Any One Lead		01-80	Note Priority below for Functions 74 and 75
	*78	Jump if OFF	"	"	"		"	
	*	Functions 77 and 78 must be preceded by Function 41 for Jump Instructions						Interrupt Source Priority Order / Jumps to Las Page, Step
					See Interrupts priority in Remarks Column			97 (01) Mem Ovfl 63
								97 (03) Character 62
								97 (09-0F) Selection 61
								75 (01-80) Detect OFF 60
								74 (01-80) Detect ON 59
								NOTE. Internal Select Switch toggle number determines if program cell is two pages or fou pages, i.e., if last page is page "1" or "3"
								See "Internal Select Switch" below Function
TIMER	80	01 to 99 Milliseconds	01-99	BCD	80 40 20 10	8421	01-99	
	81	0.01 to 0.99 Seconds	"	"	"	"	"	
	82	0.1 to 9.9 Seconds	"	"	"	"	"	
	83	Generate 1-99 Bit Periods of Delay	"	"	"	"	"	
	84	0.1 to 9.9 Seconds Timeout Interval for Interrupt Function 97 or Jump Function 47						Enable with Function 97 (0C) or Function 47
COUNTER	Δ85	Advance Base Count	00	All Space	SSSS	SSSS	00	Select EVENTS -10X on Panel
	86	Measure RTS-CTS Delay	"	"	"	"	Counter Indication	Front Panel Counter Switch positioned to DURATION RTS-CTS (8X)
	87	Counter Control						
		Reset (All Counter Positions)	"	"	"	"	00	
		Reset to 0 and Start Counter	01	BCD	"	SSSM	01	Select DURATION (8X) on Panel
		Stop Counter	02	"	"	SSMS	02	Select DURATION (8X) on Panel
		Advance Counter by One Event	03	"	"	SSMM	03	Select EVENTS (8X) on Panel
	*88	Jump if Counter is Greater than DATA	Number	"	80 40 20 10	8421	01-99	Compares two High-Order counter digits
	89	Record Counter	00	All Space	SSSS	SSSS	00	Function 89 will cause the two High Order di to be recorded into RESULTS MEMORY, i.e 01-99. Read Outcome of Function 89 in Results Memory.
	Δ	Function 85 not available in early production models.						
	*	Preceded by Function 41 for Jump Instructions.						

INTERSHAKE II FUNCTION LIST

(Continued)

LOAD INTO MEMORY								REMARKS AND USERS NOTES
GROUP	FUNCTION	DESCRIPTION	ENTER	BIT ENTRY METHOD	BIT SWITCH 8765 4321 POSITION		DATA HEX DISPLAY (Range)	
AUTO PANEL	90	Enter Syn Character	Character				00-FF	Use Internal Select Switch toggle number 7 for one sync character operation Function 90 must be used with the INTERVIEW CRT for Full Duplex operation.
	°91	Async/Sync, Info Bits, Parity	Mark/Space	XY	X 8421	Y 8421	00-88	
		Async: 1 Stop			SSZZ	ZZSS		
		Async: 2 Stop			MSZZ	ZZSS		
		Sync			SMZZ	ZZSS		
		Info Bits 5			ZZSS	ZZSS		Async: 2 Stop selects 1.5 Stop Bits for 5 Info Bit code only
		6			ZZMS	ZZSS		
		7			ZZSM	ZZSS		
		8			ZZMM	ZZSS		"Z" indicates other selections which must be made to complete the instruction
		Parity - None			ZZZZ	MSSS		
		Parity - Odd			ZZZZ	SSSS		
		Parity - Even			ZZZZ	SMSS		
	°92	Bit Rate	Bit Rate	HEX			00-F0	
		INT OSC	00		SSSS	SSSS	00	For INT OSC selections, use Internal Switch toggles "ON" to select as follows
		50 bps	10		SSSM	"	10	
		75 bps	20		SSMS	"	20	
		110 bps	30		SSMM	"	30	1 – Plug-in Crystal thru 64 Kbps
		134.5 bps	40		SMSS	"	40	2 – Var. Osc. 160 to 2500 bps.
		150 bps	50		SMSM	"	50	3 – Var. Osc. 60 to 1000 bps
		300 bps	60		SMMS	"	60	4 – Var. Osc 30 to 500 bps
		600 bps	70		SMMM	"	70	(See "Internal Select Switch" below)
		900 bps	80		MSSS	"	80	
		1.2 Kbps	90		MSSM	"	90	
		1.8 Kbps	A0		MSMS	"	A0	
		2.4 Kbps	B0		MSMM	"	B0	
		3.6 Kbps	C0		MMSS	"	C0	
		4.8 Kbps	D0		MMSM	"	D0	
		7.2 Kbps	E0		MMMS	"	E0	
		9.6 Kbps	F0		MMMM	"	F0	
	°93	Test Mode, EIA/MIL, Ext. Clock	Mark/Space	XY	X 8421	Y 8421	00-FF	As is the case for Functions 91 and 92 above, all 8 bits must be selected. "Z" indicates other selections which must be made.
		Control EIA Position:			SMMM	MZZZ		
		TD/RD			MSMM	"		
		TD			MMSM	"		
		RD			MMMS	"		
		TERM			MMMM	SZZZ		
		MODEM			ZZZZ	ZMZZ		
		INT BIT RATE			"	ZSZZ		
		EXTERNAL CLOCK			"	ZZMZ		
		CONTROL EIA OFF			"	ZZSZ		
		CONTROL EIA ON			"	ZZZM		
		EIA			"	ZZZS		
		MIL						
	°	Function is latched into Memory and remains for the duration of the program sequence unless changed by a subsequent step containing a Function 91, 92 or 93 Instruction.						

The INTERNAL SELECT SWITCH (8-Position DIP Switch) Position:

- No. 1 ON – Enables the Crystal Controlled Oscillator for high-speed operation.
- No. 2 ON – Enables the HIGH range of the variable-frequency oscillator (160-2500 Baud)
- No. 3 ON – Enables the MIDDLE range of the variable-frequency oscillator (60-1000 Baud).
- No. 4 ON – Enables the LOW range of the variable-frequency oscillator (30-500 Baud).
  NOTE: Only one of the above switches (1-0) can be turned ON at one time.
- No. 5 ON – Enables 256-Step Program format. The OFF position enables the 128-Step Program format.
- No. 6 ON – SYNC Mode Internal Clock Rec. Enables internally-generated clock signal when no clock is supplied by system Modem. Clock is then synchronized to DATA. OFF position is used when clock is supplied from system Modem.
- No. 7 ON – Enables recognition of only one SYN character in lieu of the two characters normally required for recognition.
- No. 8 UNASSIGNED.

INTERSHAKE II FUNCTION LIST

(Continued)

LOAD INTO MEMORY								REMARKS AND USERS NOTES
GROUP	FUNCTION	DESCRIPTION	ENTER		BIT ENTRY METHOD	BIT SWITCH 8765 4321 POSITION		DATA HEX DISPLAY (Range)	
PERIPHERAL CONTROLLER	94 OUTPUTS	Peripheral Controller OUTPUTS							The Control items for the INTERVIEW CRT have been completed for information and as a sample. The Control items for other external devices should be filled-in by the User from the particular DTM Option Manual. In the case of User furnished option, the User should provide the Control item list. Once selected, the Flag 0 thru 7 is set to "0" or "1" as determined by selection of the "Y"
		Define "X" for:							
		User Peripheral (User Fill In) (Typical for INTERVIEW CRT)			XY	X 8421	Y 8421		
		Clear Screen	0-			SSSS		00-01	
		Select Page 1	1-			SSSM		10-11	
		Select Page 2	2-			SSMS		20-21	
		Freeze Display	3-			SSMM		30-31	
		Unassigned	4-			SMSS		40-41	
		Reverse Image	5-			SMSM		50-51	
		Low Intensity	6-			SMMS		60-61	
		Blink	7-			SMMM		70-71	
		Define "Y" for:							
		User Peripheral (User Fill In) (Typical for INTERVIEW CRT)							
		Disable	-0 Output Only				SSSS	00-70	OUTPUT Only: Y=0 sets Flag to "0". Y=1 sets Flag to "1"
		Enable	-1 "				SSSM	01-71	
	*94 INPUTS	Sensing eight INPUT leads from external device to be controlled by DTM-2							*Function 94 must be preceded by Function 41 for Jump Instructions.
		Define "X" for:							
		User Peripheral (User Fill In)				X 4321	Y 4321		The "Y" digit determines if the Flag is an INPUT Flag and to JUMP if the Flag is a "0" with Y=2 or to JUMP if the Flag is a "1" with Y=3
			0-			SSSS		02,03	
			1-			SSSM		12,13	
			2-			SSMS		22,23	
			3-			SSMM		32,33	
			4-			SMSS		42,43	
			5-			SMSM		52,53	
			6-			SMMS		62,63	
			7-			SMMM		72,73	
		Define "Y" for:							
		User Peripheral (User Fill In)							
			-2 Input Only				SSMS	02-72	INPUT Only: Y=2 causes Jump if Flag = "0
			-3 "				SSMM	03-73	Y=3 causes Jump if Flag = "1"
	94 OTHER OUTPUTS	Other Assignable OUTPUTS			XY	X	Y		
		Define "X" for:				8421	8421		
		(Take definition as assigned below)	5-			SMSM			
			6-			SMMS			
			7-			SMMM			
		Define "X" and "Y" for:	X	Y		8421			
		Restore assignable output to SET 1, SET 1 Mode.	5,6,7	8		"	MSSS	58,68,78	
		Generate a "1" when:							
		Data received on RD Lead	5,6,7	9		"	MSSM	59,69,79	
		RLSD Lead Turning OFF	5,6,7	A		"	MSMS	5A,6A,7A	
		DETECT TEST POINT Senses +12V	5,6	B		"	MSMM	5B,6B	
		Cause Output Signal to remain "1" when:							
		DETECT TEST POINT Senses a transient OFF	7	B		SMMM	MSMM	7B	
		Generate a "1" when:							
		Character contains PARITY ERROR	5,6,7	C		8421	MMSS	5C,6C,7C	
		Period of 1ms (X=5), 10ms (X=6), 100ms (X=7).	5,6,7	D		"	MMSM	5D,6D,7D	
		Generate 900ns positive pulse	5	E		SMSM	MMMS	5E	
		Unassigned for X=6 and X=7	6,7	E		8421	"	,6E,7E	
		Loop signal back from external device	5,6,7	F		"	MMMM	5F,6F,7F	
		Preceded by Function 41 for Jump Instructions.							

INTERSHAKE II FUNCTION LIST

(Continued)

GROUP	FUNCTION	DESCRIPTION	ENTER	BIT ENTRY METHOD	BIT SWITCH 6765 4321 POSITION X	BIT SWITCH 6765 4321 POSITION Y	DATA HEX DISPLAY (Range)	REMARKS AND USERS NOTES
		LOAD INTO MEMORY						**REMARKS AND USERS NOTES**
RECEIVE SYNC	°95	Auto Resync and Sync Search		XY				Related Functions are:
		Define "X" for Auto Resync:			8421	8421		90 – Enter Syn Character
		OFF (Normal OFF)	0-		SSSS			96 – SDLC Control
		ON	1-		SSSM			Anytime Function 95 is used, it always takes the out-of-sync and looks for a new sync.
		Define "Y" for Out-Of-Sync:						
		Normal (8 pads or change of signal)	-0			SSSS	00	For Full Duplex operation with the INTERVIEW CRT, the Test Selector Switch must be in the TD/RD position.
		Other (1-7 pads or change os signal)	-1 thru -7				01-17	
SDLC/ ADCCP	°96	SDLC/ADCCP		XY	X	Y	00-76	The "Y" value selected must be "0" (of no consequence - zero delay) or one of the other "1" thru "6" values below.
		Define "X" for:			8421	8421		
		SDLC Mode OFF (Normal OFF)	0-		SSSS		00-06	
		SDLC Mode ON	1-		SSSM		10-16	
		SDLC NRZ ON	3-		SSMM		30-36	
		SDLC Mode ON (Inhibit "0" insert)	5-		SMSM		50-56	Used for sending Flag for X=1
		SDLC/NRZ ON (Inhibit "0" insert)	7-		SMMM		70-76	Used for sending Flag for X=3
RECEIVER DELAY	°96	Define "Y" for:						The "X" value selected must be "0" (of no consequence - modes OFF) or one of the other "1" thru "7" values above
		ASYNC / SYNC						
		Zero Delay / Zero Delay (Normal OFF)	-0			SSSS	00-70	
		4 Bits Delay / 64 Bits Delay	-1			SSSM	01-71	
		8 Bits Delay / 128 Bits Delay	-2			SSMS	02-72	
		64 Bits Delay / 1024 Bits Delay	-3			SSMM	03-73	The Delay is between the RS-232 Interface and the Receiver for Signal Path and Detect Test Point Path.
		128 Bits Delay / 2048 Bits Delay	-4			SMSS	04-74	
		192 Bits Delay / 3072 Bits Delay	-5			SMSM	05-75	
		256 Bits Delay / 4096 Bits Delay	-6			SMMS	06-76	
INTERRUPTS	°97	Interrupts		HEX	8421	8421	00-FF	
		Results Memory:						Vectors to Step 63, Last Page.
		Memory Full Disable (Normal OFF)	00		SSSS	SSSS	00	
		Memory Full Enable	01		"	SSSM	01	
		Character Interrupt:						Vectors to Step 62, Last Page
		Character Disable (Normal OFF)	02		"	SSMS	02	
		Character Enable (Function 19)	03		"	SSMM	03	
		Interrupt Group 8-F						Vectors to Step 61, Last Page.
		Disable 09-0F (Normal OFF)	08		"	MSSS	08	Other Interrupt related Functions:
		Parity Error	09		"	MSSM	09	09-Record Interrupt Step
		Counter Overflow Indicator	0A		"	MSMS	0A	19-Enter Interrupt Step
		Counter End Indicator	0B		"	MSMM	0B	74-Interrupt RS-232(V.24) ON
		Timeout (Function 84 presets Timer)	0C		"	MMSS	0C	75-Interrupt RS-232(V.24) OFF
		Out-of-Sync	0D		"	MMSM	0D	76-Cancel Interrupt 74 and 75
		Frame Detect	0E		"	MMMS	0E	84-Enter Interrupt Timeout
		Unassigned	0F		"	MMMM	0F	98-(01) Restart at Interrupted Step.
	°	This Function is latched into Memory and must be restored to normal OFF at the point in the program sequence where it is desired that subsequent Functions not be effected.						Interrupt Source Priority Order / Jumps To Last Page, Step 97 (01) Mem Ovfl 63 97 (03) Character 62 97 (09-0F) Selection 61 75 (01-80) Detect OFF 60 74 (01-80) Detect ON 59 NOTE: Internal Select Switch toggle number 5 determines if program call is two pages or four pages, i.e., if last page is page "1" or "3".
					See Interrupts Priority in Remarks Column			
END	98	Recycle/Restart/Skip		BCD	8421	8421		
		Restarts the Test at 00 Page 0	00		SSSS	SSSS	00	
		Restarts the Test at the Interrupted Step	01		"	SSSM	01	
		Skips the Step (or No-Op)	02		"	SSMS	02	
		Clear CRC Calculation (Receive SDLC)	03		"	SSMM	03	
	99	Stop	00	All Space	"	SSSS	00	
		THE FOLLOWING FUNCTIONS HAVE BEEN ADDED FOR SERIAL NUMBER SERIES "F" AND ABOVE						
JUMP	06	Jump Bit Switches/Char	CHARACTER				00-FF	Precede 06 with 41 or 27
Ref FUN 48,49	24	Increment Results Memory	00	All Space	SSSS	SSSS	-	Advances Results Mem. one step
SUBROUTINE	27	Preset Return Address	00-FF	XY			-	Similar to FUN 41 except only used by FUN 28 to cause a jump FUN
SUBROUTINE	28	Return	00	All Space	SSSS	SSSS	-	Acts like an unconditional JUMP to address of previous FUN 27.
JUMP	29	Jump Results Mem/Character	CHARACTER				-	Does NOT advance RM step
Ref FUN 98	37	Force In Sync	00	All Space	SSSS	SSSS	-	Use In Sync Mode only. Next clock defines 1st Bit of 1st character
COUNTER	85	Advance Base Count 10^X	00	All Space	SSSS	SSSS	-	Select Panel Switch to EVENT 10^X
AUTO PANEL	91	Data 1 disables outsync on idle characters						
AUTO SYNC	95	Data 2, 4, 6 causes outsync after 2, 4, or 6 characters						

TP-144-01-78

APPENDIX C

UNIVERSAL CODE CHART FOR DATA COMMUNICATIONS

APPENDIX C

UNIVERSAL CODE CHART FOR DATA COMMUNICATIONS

UNIVERSAL CODE CHART FOR DATA COMMUNICATIONS

Char	8 BIT ASCII Binary	Hex	7-BIT ASCII Binary	Hex	EVEN PARITY ASCII Binary	Hex	ODD PARITY ASCII Binary	Hex	EBCDIC Binary	Hex
A	11 000 001	C1	1 000 001	41	01 000 001	41	11 000 001	C1	11 000 001	C1
B	11 000 010	C2	1 000 010	42	01 000 010	42	11 000 010	C2	11 000 010	C2
C	11 000 011	C3	1 000 011	43	11 000 011	C3	01 000 011	43	11 000 011	C3
D	11 000 100	C4	1 000 100	44	01 000 100	44	11 000 100	C4	11 000 100	C4
E	11 000 101	C5	1 000 101	45	11 000 101	C5	01 000 101	45	11 000 101	C5
F	11 000 110	C6	1 000 110	46	11 000 110	C6	01 000 110	46	11 000 110	C6
G	11 000 111	C7	1 000 111	47	01 000 111	47	11 000 111	C7	11 000 111	C7
H	11 001 000	C8	1 001 000	48	01 001 000	48	11 001 000	C8	11 001 000	C8
I	11 001 001	C9	1 001 001	49	11 001 001	C9	01 001 001	49	11 001 001	C9
J	11 001 010	CA	1 001 010	4A	11 001 010	CA	01 001 010	4A	11 010 001	D1
K	11 001 011	CB	1 001 011	4B	01 001 011	4B	11 001 011	CB	11 010 010	D2
L	11 001 100	CC	1 001 100	4C	11 001 100	CC	01 001 100	4C	11 010 011	D3
M	11 001 101	CD	1 001 101	4D	01 001 101	4D	11 001 101	CD	11 010 100	D4
N	11 001 110	CE	1 001 110	4E	01 001 110	4E	11 001 110	CE	11 010 101	D5
O	11 001 111	CF	1 001 111	4F	11 001 111	CF	01 001 111	4F	11 010 110	D6
P	11 010 000	D0	1 010 000	50	01 010 000	50	11 010 000	D0	11 010 111	D7
Q	11 010 001	D1	1 010 001	51	11 010 001	D1	01 010 001	51	11 011 000	D8
R	11 010 010	D2	1 010 010	52	11 010 010	D2	01 010 010	52	11 011 001	D9
S	11 010 011	D3	1 010 011	53	01 010 011	53	11 010 011	D3	11 100 010	E2
T	11 010 100	D4	1 010 100	54	11 010 100	D4	01 010 100	54	11 100 011	E3
U	11 010 101	D5	1 010 101	55	01 010 101	55	11 010 101	D5	11 100 100	E4
V	11 010 110	D6	1 010 110	56	01 010 110	56	11 010 110	D6	11 100 101	E5
W	11 010 111	D7	1 010 111	57	11 010 111	D7	01 010 111	57	11 100 110	E6
X	11 011 000	D8	1 011 000	58	11 011 000	D8	01 011 000	58	11 100 111	E7
Y	11 011 001	D9	1 011 001	59	01 011 001	59	11 011 001	D9	11 101 000	E8
Z	11 011 010	DA	1 011 010	5A	01 011 010	5A	11 011 010	DA	11 101 001	E9
a	11 100 001	E1	1 100 001	61	11 100 001	E1	01 100 001	61	10 000 001	81
b	11 100 010	E2	1 100 010	62	11 100 010	E2	01 100 010	62	10 000 010	82
c	11 100 011	E3	1 100 011	63	01 100 011	63	11 100 011	E3	10 000 011	83
d	11 100 100	E4	1 100 100	64	11 100 100	E4	01 100 100	64	10 000 100	84
e	11 100 101	E5	1 100 101	65	01 100 101	65	11 100 101	E5	10 000 101	85
f	11 100 110	E6	1 100 110	66	01 100 110	66	11 100 110	E6	10 000 110	86
g	11 100 111	E7	1 100 111	67	11 100 111	E7	01 100 111	67	10 000 111	87
h	11 101 000	E8	1 101 000	68	11 101 000	E8	01 101 000	68	10 001 000	88
i	11 101 001	E9	1 101 001	69	01 101 001	69	11 101 001	E9	10 001 001	89
j	11 101 010	EA	1 101 010	6A	01 101 010	6A	11 101 010	EA	10 010 001	91
k	11 101 011	EB	1 101 011	6B	11 101 011	EB	01 101 011	6B	10 010 010	92
l	11 101 100	EC	1 101 100	6C	01 101 100	6C	11 101 100	EC	10 010 011	93
m	11 101 101	ED	1 101 101	6D	11 101 101	ED	01 101 101	6D	10 010 100	94
n	11 101 110	EE	1 101 110	6E	11 101 110	EE	01 101 110	6E	10 010 101	95
o	11 101 111	EF	1 101 111	6F	01 101 111	6F	11 101 111	EF	10 010 110	96
p	11 110 000	F0	1 110 000	70	11 110 000	F0	01 110 000	70	10 010 111	97
q	11 110 001	F1	1 110 001	71	01 110 001	71	11 110 001	F1	10 011 000	98
r	11 110 010	F2	1 110 010	72	01 110 010	72	11 110 010	F2	10 011 001	99
s	11 110 011	F3	1 110 011	73	11 110 011	F3	01 110 011	73	10 100 010	A2
t	11 110 100	F4	1 110 100	74	01 110 100	74	11 110 100	F4	10 100 011	A3
u	11 110 101	F5	1 110 101	75	11 110 101	F5	01 110 101	75	10 100 100	A4
v	11 110 110	F6	1 110 110	76	11 110 110	F6	01 110 110	76	10 100 101	A5
w	11 110 111	F7	1 110 111	77	01 110 111	77	11 110 111	F7	10 100 110	A6
x	11 111 000	F8	1 111 000	78	01 111 000	78	11 111 000	F8	10 100 111	A7
y	11 111 001	F9	1 111 001	79	11 111 001	F9	01 111 001	79	10 101 000	A8
z	11 111 010	FA	1 111 010	7A	11 111 010	FA	01 111 010	7A	10 101 001	A9
0	10 110 000	B0	0 110 000	30	00 110 000	30	10 110 000	B0	11 110 000	F0
1	10 110 001	B1	0 110 001	31	10 110 001	B1	00 110 001	31	11 110 001	F1
2	10 110 010	B2	0 110 010	32	10 110 010	B2	00 110 010	32	11 110 010	F2
3	10 110 011	B3	0 110 011	33	00 110 011	33	10 110 011	B3	11 110 011	F3
4	10 110 100	B4	0 110 100	34	10 110 100	B4	00 110 100	34	11 110 100	F4
5	10 110 101	B5	0 110 101	35	00 110 101	35	10 110 101	B5	11 110 101	F5
6	10 110 110	B6	0 110 110	36	00 110 110	36	10 110 110	B6	11 110 110	F6
7	10 110 111	B7	0 110 111	37	10 110 111	B7	00 110 111	37	11 110 111	F7
8	10 111 000	B8	0 111 000	38	10 111 000	B8	00 111 000	38	11 111 000	F8
9	10 111 001	B9	0 111 001	39	00 111 001	39	10 111 001	B9	11 111 001	F9
SP	10 100 000	A0	0 100 000	20	10 100 000	A0	00 100 000	20	01 000 000	40
!	10 100 001	A1	0 100 001	21	00 100 001	21	10 100 001	A1	01 011 010	5A
"	10 100 010	A2	0 100 010	22	00 100 010	22	10 100 010	A2	01 111 111	7F
#	10 100 011	A3	0 100 011	23	10 100 011	A3	00 100 011	23	01 111 011	7B
$	10 100 100	A4	0 100 100	24	00 100 100	24	10 100 100	A4	01 011 011	5B
%	10 100 101	A5	0 100 101	25	10 100 101	A5	00 100 101	25	01 101 100	6C
&	10 100 110	A6	0 100 110	26	10 100 110	A6	00 100 110	26	01 010 000	50
'	10 100 111	A7	0 100 111	27	00 100 111	27	10 100 111	A7	01 111 101	7D
(	10 101 000	A8	0 101 000	28	00 101 000	28	10 101 000	A8	01 001 101	4D
)	10 101 001	A9	0 101 001	29	10 101 001	A9	00 101 001	29	01 011 101	5D
*	10 101 010	AA	0 101 010	2A	10 101 010	AA	00 101 010	2A	01 011 100	5C
+	10 101 011	AB	0 101 011	2B	00 101 011	2B	10 101 011	AB	01 001 110	4E
,	10 101 100	AC	0 101 100	2C	10 101 100	AC	00 101 100	2C	01 101 011	6B
	10 101 101	AD	0 101 101	2D	00 101 101	2D	10 101 101	AD	01 100 000	60
	10 101 110	AE	0 101 110	2E	00 101 110	2E	10 101 110	AE	01 001 011	4B
/	10 101 111	AF	0 101 111	2F	10 101 111	AF	00 101 111	2F	01 100 001	61

Char	6-BIT TRANSCODE Binary	Hex	6-BIT TYPESETTER Binary	Hex	EBCD Binary C 124 8AB	Hex	PTTC/REV EBCD Binary C 12 48AB	Hex	PTTC/REV BCD Binary C 12 48AB	Hex	SELECTRIC Binary C 124 8AB	Hex	FIELD DATA Binary	Hex	BAUDOT Fig.	Binary	Hex
A	000 001	01	000 011	03	0 100 011	23	00 110 001	31	00 110 001	31	1 111 001	79	000 110	06	–	00 011	03
B	000 010	02	011 001	19	0 010 011	13	00 110 010	32	00 110 010	32	1 110 110	76	000 111	07	?	11 001	19
C	000 011	03	001 110	0E	1 110 011	73	01 110 011	73	00 110 011	33	1 111 010	7A	001 000	08	:	01 110	0E
D	000 100	04	001 001	09	0 001 011	0B	00 110 100	34	00 110 100	34	0 101 010	2A	001 001	09	$	01 001	09
E	000 101	05	000 001	01	1 101 011	6B	01 110 101	75	00 110 101	35	1 001 010	4A	001 010	0A	3	00 001	01
F	000 110	06	001 101	0D	1 011 011	5B	01 110 110	76	00 110 110	36	1 110 011	73	001 011	0B	!	01 101	0D
G	000 111	07	011 010	1A	0 111 011	3B	00 110 111	37	00 110 111	37	0 100 011	23	001 100	0C	&	11 010	1A
H	001 000	08	010 100	14	0 000 111	07	00 111 000	38	00 111 000	38	0 100 110	26	001 101	0D	#	10 100	14
I	001 001	09	000 110	06	1 100 111	67	01 111 001	79	00 111 001	39	0 011 001	19	001 110	0E	8	00 110	06
J	010 001	11	001 011	0B	1 100 001	61	01 100 001	61	00 100 001	21	1 000 011	43	001 111	0F	'	01 011	0B
K	010 010	12	001 111	0F	1 010 001	51	01 100 010	62	00 100 010	22	0 011 010	1A	010 000	10	(	01 111	0F
L	010 011	13	010 010	12	0 110 001	31	00 100 011	23	00 100 011	23	1 000 110	46	010 001	11	)	10 010	12
M	010 100	14	011 100	1C	1 001 001	49	01 100 100	64	00 100 100	24	1 100 001	61	010 010	12	.	11 100	1C
N	010 101	15	001 100	0C	0 101 001	29	00 100 101	25	00 100 101	25	1 010 010	52	010 011	13	,	01 100	0C
O	010 110	16	011 000	18	0 011 001	19	00 100 110	26	00 100 110	26	1 000 101	45	010 100	14	9	11 000	18
P	010 111	17	010 110	16	1 111 001	79	01 100 111	67	00 100 111	27	0 001 011	0B	010 101	15	0	10 110	16
Q	011 000	18	010 111	17	1 000 101	45	01 101 000	68	00 101 000	28	1 011 011	5B	010 110	16	1	10 111	17
R	011 001	19	001 010	0A	0 100 101	25	00 101 001	29	00 101 001	29	0 101 001	29	010 111	17	4	01 010	0A
S	100 010	22	000 101	05	1 010 010	52	01 010 010	52	00 010 010	12	0 100 101	25	011 000	18	Bell	00 101	05
T	100 011	23	010 000	10	0 110 010	32	00 010 011	13	00 010 011	13	0 000 010	02	011 001	19	5	10 000	10
U	100 100	24	000 111	07	1 001 010	4A	01 010 100	54	00 010 100	14	0 110 010	32	011 010	1A	7	00 111	07
V	100 101	25	011 110	1E	0 101 010	2A	00 010 101	15	00 010 101	15	0 110 001	31	011 011	1B	;	11 110	1E
W	100 110	26	010 011	13	0 011 010	1A	00 010 110	16	00 010 110	16	1 110 101	75	011 100	1C	2	10 011	13
X	100 111	27	011 101	1D	1 111 010	7A	01 010 111	57	00 010 111	17	1 100 010	62	011 101	1D	/	11 101	1D
Y	101 000	28	010 101	15	1 000 110	46	01 011 000	58	00 011 000	18	1 100 111	67	011 110	1E	6	10 101	15
Z	101 001	29	010 001	11	0 100 110	26	00 011 001	19	00 011 001	19	1 010 100	54	011 111	1F	"	10 001	11

6-BIT TRANSCODE: (NO LOWER CASE)

6-BIT TYPESETTER: CAPS = "SHIFT"; LC = "UNSHIFT"; UNSHIFT 011 111 1F; SHIFT 011 011 1B

EBCD: CAPS = "UC"; LC = "LC"; LC 00 011 111 1F; UC 00 011 100 1C

PTTC/REV EBCD: CAPS = "UC"; LC = "LC"; LC 00 111 110 3E; UC 00 001 110 0E

PTTC/REV BCD: CAPS = "UC"; LC = "LC"; LC 00 111 110 3E; UC 00 001 110 0E

SELECTRIC: CAPS = "UC"; LC = "LC"; LC 00 011 111 1F; UC 00 011 100 1C

FIELD DATA: (NO LOWER CASE)

BAUDOT: (NO LOWER CASE); "LETTERS" 11 111 1F; "FIGURES" 11 011 1B

COURTESY OF

ATLANTIC RESEARCH CORPORATION

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MANUFACTURERS OF INTERSHAKE and DATA TEK 9600

UPPER CASE (U) / LOWER CASE (L) / EITHER (*) — case key for EBCD, PTTC/REV EBCD, PTTC/REV BCD and SELECTRIC

Char	6-BIT TRANSCODE Binary	Hex	6-BIT TYPESETTER Binary	Case	Hex	EBCD Binary	Case	Hex	PTTC/REV EBCD Binary	Case	Hex	PTTC/REV BCD Char	Binary	Case	Hex	SELECTRIC Binary	Case	Hex	FIELD DATA Binary	Hex	BAUDOT Binary	Case	Hex
0	110 000	30	110 110	U	36	01 010 100	L	54	01 001 010	L	4A	0	00 001 010	L	0A	01 100 100	L	64	110 000	30	10 110	F	16
1	110 001	31	111 101	U	3D	00 100 000	L	20	00 000 001	L	01	1	00 000 001	L	01	00 100 000	L	20	110 001	31	10 111	F	17
2	110 010	32	110 011	U	33	00 010 000	L	10	00 000 010	L	02	2	00 000 010	L	02	00 010 000	L	10	110 010	32	10 011	F	13
3	110 011	33	100 001	U	21	00 110 000	L	30	00 000 011	L	03	3	00 000 011	L	03	01 110 000	L	70	110 011	33	00 001	F	01
4	110 100	34	101 010	U	2A	00 001 000	L	08	00 000 100	L	04	4	00 000 100	L	04	00 000 100	L	04	110 100	34	01 010	F	0A
5	110 101	35	110 000	U	30	01 101 000	L	68	01 000 101	L	45	5	00 000 101	L	05	00 001 000	L	08	110 101	35	10 000	F	10
6	110 110	36	110 101	U	35	01 011 000	L	58	01 000 110	L	46	6	00 000 110	L	06	01 011 000	L	58	110 110	36	10 101	F	15
7	110 111	37	100 111	U	27	00 111 000	L	38	00 000 111	L	07	7	00 000 111	L	07	01 101 000	L	68	110 111	37	00 111	F	07
8	111 000	38	100 110	U	26	00 000 100	L	04	00 001 000	L	08	8	00 001 000	L	08	00 111 000	L	38	111 000	38	11 010	F	1A
9	111 001	39	111 000	U	38	01 100 100	L	64	01 001 001	L	49	9	00 001 001	L	09	00 110 100	L	34	111 001	39	11 000	F	18
SP	011 010	1A	000 100	S/U	04	01 000 000	–	40	01 000 000	–	40	SP	00 000 000	–	00	01 000 000	–	40	000 101	05	00 100		04
!			100 011	S	23	01 110 101	U	75		U	6B	!	00 101 011	U	2B	00 000 001	L	01	101 101	2D	01 101	F	0D
"						00 110 100	U	34		U	0B	"	00 000 111	U	07	01 001 001	U	49			10 001	F	11
#	111 011	3B				00 110 100	L	34		L	0B					01 110 000	U	70	100 110	26	10 100	F	14
$	011 011	1B	100 011	U	23	01 110 101	L	75		L	6B	$	00 101 011	L	2B	00 000 100	U	04	100 111	27	01 001	F	09
%	101 100	2C				01 101 000	U	68	01 000 101	U	45	%	00 000 101	U	05	00 001 000	U	08	101 010	2A			
&	010 000	10	111 000	S	38	01 000 011	L	43	01 110 000	L	70	&	00 110 000	L	30	01 101 000	U	68	000 001	01			
'						01 011 000	U	68	01 000 110	U	46	'	00 000 110	U	06	01 001 001	L	49	111 010	3A	01 011	F	0B
(			110 001	S	31	01 100 100	U	64	01 001 001	U	49	(	00 001 001	U	09	00 110 100	U	34	101 001	29	01 111	F	0F
)			110 001	U	31	00 100 100	U	54	00 001 001	U	09	)	00 001 010	U	0A	01 100 100	U	64	100 000	20	10 010	F	12
*	011 100	1C				00 000 100	U	04	00 001 000	U	08	*	00 001 000	U	08	00 111 000	U	38	101 000	28			
+						01 000 011	U	43	01 110 000	U	70	+	00 110 000	U	30	00 010 011	U	13	100 010	22			
,	101 011	2B				01 110 110	L	76	01 011 000	L	6B	,	00 011 011	L	1B	00 111 011	*	3B	101 110	2E	01 100	F	0C
	100 000	20	101 001	U	29	00 000 001	*	01	00 100 000	*	20		00 100 000	*	20	00 110 111	L	37	100 001	21	00 011	F	03
	001 011	0B	111 100	S/U	3C	00 110 111	L	37	00 111 011	L	3B		00 111 011	L	3B	01 010 001	*	51	111 101	3D	11 100	F	1C
/	100 001	21				01 100 010	L	62	01 010 001	L	61	/	00 010 001	L	11	00 000 111	L	07	111 100	3C	11 101	F	1D

UNIVERSAL CODE CHART FOR DATA COMMUNICATIONS

8-BIT ASCII			7 BIT ASCII			EVEN PARITY ASCII			ODD PARITY ASCII			EBCDIC			6-BIT FIELDATA CODE			6-BIT TYPESETTER			EBCD BINARY C 12 4 6 A B		HEX	FTTC/REV EBCD BINARY C 12 4 6 A B		HEX	FTTC/REV BCD BINARY C 12 4 6 A B		HEX	SELECTRIC BINARY C 12 4 6 A B		HEX	FIELD DATA			BAUDOT		
	BINARY	HEX		BINARY	HEX		BINARY	HEX		BINARY	HEX		BINARY	HEX		BINARY	HEX		BINARY	HEX																			
:	10 111 010	8A	:	0 111 010	3A	:	00 111 010	3A	:	10 111 010	8A	:	01 111 010	7A				:	111 010 S	3A	:	00 001 000 U	08		:	00 000 100 U	04		:	00 001 000 U	08	:	01 101 011 U	2B	:	01 011	2B	:	01 110	F 0E
;	10 111 011	8B	;	0 111 011	3B	;	00 111 011	3B	;	00 111 011	3B	;	01 011 110	5E				;	111 010 U	3A	;	00 170 000 U	20		;	00 000 011 U	03		;	00 000 011 U	03	;	01 101 011 L	6B	;	111 011	3B	;	11 110	F 1E
<	10 111 100	8C	<	0 111 100	3C	<	00 111 100	3C	<	10 111 100	8C	<	01 001 100	4C	<	001 100	0C				<	00 010 000 U	10		<	00 000 010 U	02								<	100 011	23			
=	10 111 101	8D	=	0 111 101	3D	=	00 111 101	3D	=	10 111 101	8D	=	01 111 110	7E				=			=	00 100 000 U	20		=	00 000 001 U	01		=	00 000 001 U	01	=	00 010 011 L	13	=	100 100	24			
>	10 111 110	8E	>	0 111 110	3E	>	00 111 110	3E	>	10 111 110	8E	>	01 101 110	6E				>			>	00 111 000 U	38		>	00 000 111 U	07		>	00 000 111 U	07				>	100 101	25			
?	10 111 111	8F	?	0 111 111	3F	?	00 111 111	3F	?	10 111 111	8F	?	01 101 111	6F	?	110 110 S	36	?	110 110 S	36	?	00 011 010 U	12		?	01 010 001 U	11		?	01 010 001 U	11	?	00 000 111 U	07	?	101 100	2C	?	11 001	F 19
@	11 000 000	C0	@	1 000 000	40	@	11 000 000	C0	@	01 000 000	40	@	01 111 100	7C	@	111 100	3C	@	101 001 S	29	@	00 000 010 L	02		@	00 010 000 L	10		@	00 010 000 L	10	@	00 010 000 U	10	@	101 111	2F			
[	11 011 011	DB	[	1 011 011	5B	[	11 011 011	DB	[	01 011 011	5B																					[	00 100 000 U	20	[	000 011	03			
\	11 011 100	DC	\	1 011 100	5C	\	11 011 100	DC	\	01 011 100	5C	\	11 100 000	E0																											
]	11 011 101	DD	]	1 011 101	5D	]	11 011 101	DD	]	01 011 101	5D																					]	00 100 000 L	20	]	000 100	04			
^	11 011 110	DE	^	1 011 110	5E	^	11 011 110	DE	^	01 011 110	5E																					^	00 010 000	02						
_	11 011 111	DF	_	1 011 111	5F	_	11 011 111	DF	_	01 011 111	5F	_	01 101 101	6D																		_	00 110 111 U	37						
`			`	1 100 000	60	`	01 100 000	60	`	11 100 000	E0	`	01 111 001	79																											
{	11 111 011	FB	{	1 111 011	7B	{	01 111 011	7B	{	11 111 011	FB	{	11 000 000	C0								UPPER CASE (U) LOWER CASE (L) EITHER (*)				UPPER CASE (U) LOWER CASE (L) EITHER (*)				UPPER CASE (U) LOWER CASE (L) EITHER (*)				UPPER CASE (U) LOWER CASE (L) EITHER (*)								
:	11 111 100	FC	:	1 111 100	7C	:	11 111 100	FC	:	01 111 100	7C	:	01 101 010	6A																											
}	11 111 101	FD	}	1 111 101	7D	}	11 111 101	FD	}	01 111 101	7D	}	11 010 000	D0																											
~	11 111 110	FE	~	1 111 110	7E	~	01 111 101	7E	~	11 111 110	FE	~	10 100 001	A1																											
												¢	01 001 010	4A							¢	00 000 010 U	02		¢	00 000 000 U	10		¢	00 010 000 U	10	¢	01 011 000 U	08						
												¬	01 011 111	5F				[V 101 000 S/U 28]			¬	00 110 111 U	37		¬	00 111 011 U	3B														
												|	01 001 111	4F							|	01 110 110 U	76		|	01 011 011 U	6B														
																					±	U	08		±	00 100 000 U	20														
																					°	U	02		°	00 000 001 U	01														
																		[UNSHIFT 011 111 1F SHIFT 011 011 1B]			[UC 00 011 100 1C LC 00 011 111 1F]				[UC 00 001 110 0E LC 00 111 110 3E]				[UC 00 001 110 0E LC 00 111 110 3E]				[UC 00 011 100 1C LC 00 011 111 1F]						[FIGS 11 011 1B LTRS 11 111 1F]		
ACK	10 000 110	86	ACK	0 000 110	06	ACK	00 000 110	06	ACK	10 000 110	86	ACK	00 101 110	2E																											
BEL	10 000 111	87	BEL	0 000 111	07	BEL	00 000 111	07	BEL	00 000 111	07	BEL	00 101 111	2F	BEL	001 101	0D	BEL	101 011	2B																			
BS	10 001 000	88	BS	0 001 000	08	BS	10 001 000	88	BS	00 001 000	08	BS	00 010 110	16							BS	01 011 101	5D		BS	01 101 110	6E		BS	00 101 110	2E	BS	01 011 101	5D						
												BYP	00 100 100	24							BYP	00 001 110	0E		BYP	00 011 100	1C		BY	00 001 110	0E								
CAN	10 011 000	98	CAN	0 011 000	18	CAN	00 011 000	18	CAN	10 011 000	98	CAN	00 011 000	18																											
												CC	00 011 010	1A																											
CR	10 001 101	8D	CR	0 001 101	0D	CR	10 001 101	8D	CR	00 001 101	0D	CR	00 001 101	0D				RET 001 000	08																		CR	111 111	3F	CR	01 000	08
DC1	10 010 001	91	DC1	0 010 001	11	DC1	00 010 001	11	DC1	10 001 001	91	DC1	00 010 001	11																											
DC2	10 010 010	92	DC2	0 010 010	12	DC2	00 010 010	12	DC2	10 010 010	92	DC2	00 010 010	12																											
DC3	10 010 011	93	DC3	0 010 011	13	DC3	10 010 011	93	DC3	00 010 011	13	DC3	00 010 011	13																											
DC4	10 010 100	94	DC4	0 010 100	14	DC4	00 010 100	14	DC4	10 010 100	94	DC4	00 011 100	3C																											
DEL	11 111 111	FF	DEL	1 111 111	7F	DEL	11 111 111	FF	DEL	01 111 111	7F	DEL	00 000 111	07	DEL	111 111	3F	RUBOUT 111 111		3F	DEL	01 111 111	7F		DEL	01 111 111	7F		DEL	00 111 111	3F	DEL	01 111 111	7F						
DLE	10 010 000	90	DLE	0 010 000	10	DLE	10 010 000	90	DLE	00 010 000	10	DLE	00 010 000	10	DLE	011 111	1F																							
												DS	00 100 000	20				ELEVATE 000 010 02																							
EM	10 011 001	99	EM	0 011 001	19	EM	10 011 001	99	EM	00 011 001	19	EM	00 011 001	19	EM	111 110	3E	THIN SP 100 000 20																							
ENQ	10 000 101	85	ENQ	0 000 101	05	ENQ	10 000 101	85	ENQ	00 000 101	05	ENQ	00 101 101	2D	ENQ	101 101	2D	ADD TH SP 100 100 24																							
												EOB	00 100 110	26				EM SP 100 101 25			EOB	01 011 110	5E		EOB	01 011 110	5E		EOB	01 011 110	5E	EOB	01 011 110	5E						
EOT	10 000 100	84	EOT	0 000 100	04	EOT	10 000 100	84	EOT	00 000 100	04	EOT	00 110 111	37	EOT	011 110	1E	EN SP 101 110 2E			EOT	01 001 111	4F		EOT	01 001 111	4F		EOT	00 001 111	0F	EOT	01 111 100	7C						
ESC	10 011 011	9B	ESC	0 011 011	1B	ESC	00 011 011	1B	ESC	10 011 011	9B	ESC	00 100 111	27	ESC	101 010	2A	QA 101 111 2F																							
ETB	10 010 111	97	ETB	0 010 111	17	ETB	00 010 111	17	ETB	10 010 111	97	ETB	00 100 110	26	ETB	001 111	0F	V RULE 110 010 32																							
ETX	10 000 011	83	ETX	0 000 011	03	ETX	00 000 011	03	ETX	10 000 011	83	ETX	00 000 011	03	ETX	101 110	2E	EM LEAD 110 100 34																							
FF	10 001 100	8C	FF	0 001 100	0C	FF	00 001 100	0C	FF	10 001 100	8C	FF	00 001 100	0C				EN LEAD 110 111 37																					FF	111 110	3E			
FS	10 011 100	9C	FS	0 011 100	1C	FS	00 011 100	1C	FS	10 011 100	9C	FS	00 100 010	22				U RAIL 111 001 39																							
GS	10 011 101	9D	GS	0 011 101	1D	GS	00 011 101	1D	GS	10 011 101	9D							L RAIL 111 011 3B																							
HT	10 001 001	89	HT	0 001 001	09	HT	00 001 001	09	HT	10 001 001	89	HT	00 000 101	05	HT	101 111	2F	Q CENT 111 110 3E			HT	00 101 111	2F		HT	00 111 101	3D		HT	00 111 101	3D	HT	00 101 111	2F						
												IFB	00 011 100	1C																											
												IGS	00 011 101	1D																											
												IL	00 010 111	17							IL	00 111 101	3D		IL	00 101 111	2F		IL	00 111 101	3D	IL	00 111 101	3D						
												IRS	00 011 110	1E																											
												IUS	00 011 111	1F																											
												LC	00 000 110	06							LC	00 011 111	1F		LC	00 111 110	3E		LC	00 111 110	3E	LC	00 011 111	1F						
LF	10 001 010	8A	LF	0 001 010	0A	LF	00 001 010	0A	LF	10 001 010	8A	LF	00 100 101	25							LF	01 101 110	6E		LF	01 011 101	5D		LF	00 011 101	1D	LF	01 101 110	6E				LF	00 010	02
NAK	10 010 101	95	NAK	0 010 101	15	NAK	00 010 101	95	NAK	10 010 101	95	NAK	00 111 101	3D	NAK	111 101	3D																							
												NL	00 010 101	15							NL	01 101 101	6D		NL	01 101 101	6D		NL	00 101 101	2D	NL	01 101 101	6D						
NUL	10 000 000	80	NUL	0 000 000	00	NUL	00 000 000	00	NUL	10 000 000	80	NUL	00 000 000	00																							[PER 111 101 3D]					
												PF	00 000 100	04				PF 100 010		22	PF	01 001 111	4F		PF	01 111 100	7C		PF	00 111 100	3C	PF	01 001 111	4F						
												PN	00 110 100	34							PN	01 001 100	4C		PN	01 001 100	4C		PN	00 001 100	0C	PN	01 001 100	4C						
												PRE	00 100 111	27							PRE	00 011 110	3E		PRE	00 011 111	1F		PRE	00 011 111	1F	PRE	00 111 110	3E						
												RES	00 010 100	14							RES	00 001 101	0D		RES	00 011 100	1C		RES	00 101 100	2C	RES	00 001 101	0D						
												RLF	00 001 001	09																											
RS	10 011 110	9E	RS	0 011 110	1E	RS	00 011 110	1E	RS	10 011 110	9E	RS	00 110 101	35							RS	00 101 100	3C		RS	00 001 101	0D		RS	00 001 101	0D	RS	00 101 100	2C						
SI	10 001 111	8F	SI	0 001 111	0F	SI	00 001 111	0F	SI	10 001 111	8F	SI	00 001 111	0F																											
												SM	00 101 010	2A																											
												SMM	00 001 010	0A																											
SO	10 001 110	8E	SO	0 001 110	0E	SO	00 001 110	0E	SO	10 001 110	8E	SO	00 001 110	0E																											
SOH	10 000 001	81	SOH	0 000 001	01	SOH	00 000 001	01	SOH	10 000 001	81	SOH	00 000 001	01	SOH	000 000	00																							
												SOS	00 100 001	21																											
STX	10 000 010	82	STX	0 000 010	02	STX	00 000 010	02	STX	10 000 010	82	STX	00 000 010	02	STX	001 010	0A																							
SUB	10 011 010	9A	SUB	0 011 010	1A	SUB	00 011 010	1A	SUB	10 011 010	9A	SUB	00 111 111	3F	SUB	010 110	0E																							
SYN	10 010 110	96	SYN	0 010 110	16	SYN	00 010 110	16	SYN	10 010 110	96	SYN	00 110 010	32	SYN	111 010	3A																							
												UC	00 110 110								UC	00 011 100	1C		UC	00 001 110	0E		UC	00 001 110	0E	UC	00 011 100	1C						
US	10 011 111	9F	US	0 011 111	1F	US	00 011 111	1F	US	10 011 111	9F	US	00 111 111	1F	US	011 101	1D																							
VT	10 001 011	8B	VT	0 001 011	0B	VT	00 001 011	0B	VT	10 001 011	8B	VT	00 001 011	0B																											

TP-104-1-78

NOTES

NOTES

INTERTAPE - Inter-KEY OPERATION

ERRATA OCTOBER 1978

(REF. OM875)

Condition:

1. INTERTAPE is controlled by the INTERSHAKE via the AUX Cable.

2. Inter-KEY enters the EDITOR MODE.

Problem:

INTERTAPE constantly runs (usually rewind) when the EDITOR mode is in use.

Solution:

Before entering the EDITOR mode, operate the TAPE EJECT button on the Inter-KEY. After entering the INTERSHAKE RUN mode, press the tape cartridge back into its seated position.

NOTES: 1. The tape controls are ignored when the Tape is not seated.

2. The INTERSHAKE program can sense that the tape is not inserted and the program will wait for the operator to seat the tape cartridge.

INTERTAPE will not return a BUSY when the tape is not inserted. The program should take an action, e.g., rewind, then test for BUSY. If the BUSY does not occur, the program should jump back to the rewind command. The program will then wait for the cartridge to be inserted before it continues execution.

NOTE: Any command to the tape is essentially ignored when the cartridge is out and the command must be given again when the cartridge is inserted. Specifically, the test for BUSY should cause the JUMP back to repeat the control command if BUSY does not occur. The above paragraph describes this procedure.

Any command that expects a BUSY response acknowledgement from the INTERTAPE may be used to cause the program to wait until the tape is inserted.

JLW
16 October 1978

OM 875

OPERATOR'S MANUAL

INTERTAPE

ITU

SEPTEMBER 1977

Manufactured by:

ATLANTIC RESEARCH CORPORATION
Teleproducts Division
5390 Cherokee Avenue
Alexandria, Virginia 22314

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SCOPE

This document describes the physical and functional characteristics of the Atlantic Research INTERTAPE, and provides detailed operating procedures. The document is constructed in a self-teaching form to allow the user to progress logically through the steps of learning the operations of the INTERTAPE. The sectional division is designed to provide quick reference for day-to-day use and problem solving. CHAPTER 4 describes AUTOMATIC operation under control of the INTERSHAKE DTM-2. The DTM-2 fully controls the tape to RECORD, REWIND, PLAY, STOP, WRITE MARKER, SENSE MARKER and PAUSE. A self test application program is included for the DTM-2.

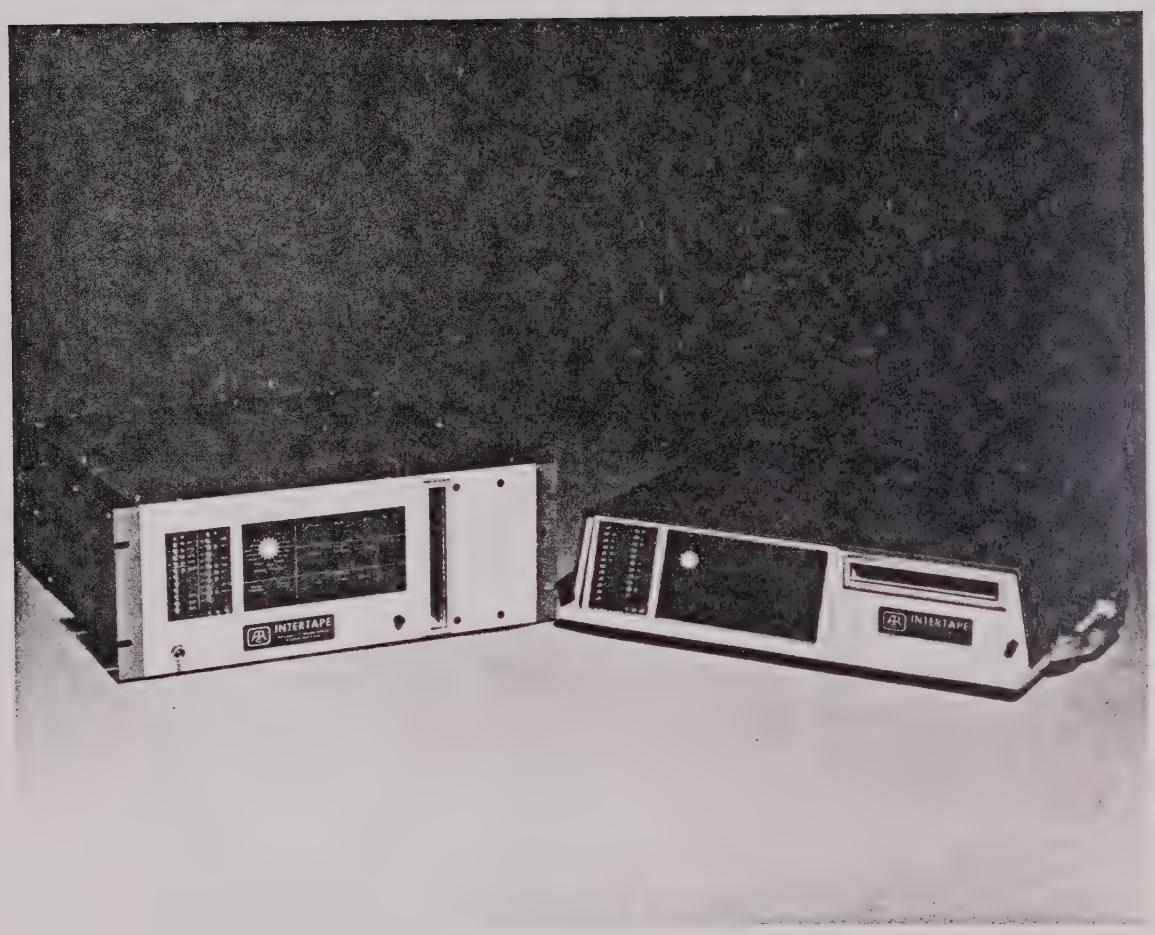


Figure 1-1. INTERTAPE Units, ITU-2 and ITU-1.

CHAPTER 1

INTRODUCTION

1.1 GENERAL DESCRIPTION

INTERTAPE is a fully portable, stand-along unit capable of recording digital communciations data and status signals regardless of the line descipline in force. INTERTAPE records full-duplex data, with as many as six status signals, at speeds up to 9600 BPS. If status recording is eliminated the unit is capable of handling data speeds up to 19,200 BPS.

INTERTAPE provides external connectors and internal switching such that a "Line Monitor" may be used for visual real time display of the line traffic being recorded and switched for replay, without recabling. INTERTAPE is also capable of stand-alone recording for later replay into a "Line Monitor" or "Test Unit" for analysis. The replay baud rate is switch selectable and is independent of the recorded line baud rate. All playback data and control status signals appear as real time line traffic at the external monitor connector.

All INTERTAPE controls and indicators are available on the front panel. In addition, a Remote Control interface is provided which allows diagnostic equipment such as INTERSHAKE to control INTERTAPE.

1.2 CAPABILITIES/FEATURES

- Records and replays full-duplex RS-232 data, plus six control signals.
- Sixteen switch-selectable data rates from 50 to 9,600 BPS (19,200 BPS optional).
- Line code and protocol independent Async, Bisync, SDLC, etc., can be recorded and replayed.
- Four-digit numeric tape position indicator.
- Continuous loop recording mode allows recording of data for indefinite time periods.
- Marker loop mode which stops recording at the end of a cartridge after a marker has been detected.
- Full cartridge mode which stops recording at the end of cartridge with or without marker detection.
- Replay baud rate independent of recorded baud rate.
- Full access to all RS-232 interfaces via test jacks (Record and Replay).

- 12 key RS-232 signals display on LED's (Record and Replay).
- The six recorded control signals may optionally be deleted during recording to increase tape recorder time.
- Built-in diagnostic record/playback feature.
- External and manual "event" inputs available to mark points of interest when recording.
- Automatic search for "events" in the Replay mode.
- Monitoring via various "Line Monitors" may be accomplished while recording.
- May be rack mounted with mounting hardware provided.

1.3 AUTOMATIC CONTROL FEATURES

- Automatic control by INTERSHAKE for

  Rewind
  Record
  Play
  Marker Record
  Marker Sense
  Pause (On Replay)

CHAPTER 2

MANUAL OPERATING PROCEDURES

This chapter describes the connection and operation of INTERTAPE. Data is recorded on the tape in a blocked format of 12K bits per block. When both data and status are recorded, 4K bits/block are reserved for TRANSMIT data; 4K bits/block are reserved for RECEIVE data; and 4K bit/block are reserved for STATUS/MARKER. When STATUS is omitted by switch selection, 6K bit/blocks of TRANSMIT data and 6K bit/blocks of RECEIVE data are recorded, thereby increasing tape storage time by 50%.

2.1 CONNECTING INTERTAPE TO SYSTEM

Figure 2-1 shows the typical system connection of INTERTAPE. INTERTAPE is installed between the Data Terminal Equipment (DTE – computer/terminal) and the Data Communication equipment (DCE – modem). The system cable from the DTE is connected to the connector labeled J1 – RECORD DTE on the rear panel of INTERTAPE. The cable for the DCE to INTERTAPE connection is supplied with the Unit. This cable is connected to the connector labeled J2 – RECORD DCE on the rear panel of INTERTAPE and to the connector on the DCE.

If physical locations of equipment are such that a "T" connection is required, the cable from "T" connector is connected to the connector labeled J1 – RECORD DTE on the rear panel of INTERTAPE, as depicted in Figure 2-1. When the INTERSHAKE TEST SYSTEM is used, it is connected to the connectors labeled MONITOR J3 and CONTROL J4 on the rear of INTERTAPE. The MONITOR connector J3 is to be used by the INTERSHAKE for all replay signals. CONTROL SIGNALS are provided via the DTM-2 "AUX" connector to control connector J4. See Note 1.

2.2 CARTRIDGE INSERTION/REMOVAL

INTERTAPE uses an Atlantic Research 35650 Data Cartridge or equivalent (see Accessories Section). Prior to installing the cartridge, the "WRITE LOCKOUT" on the cartridge should be set to the desired position. If the data on the tape is not to be erased or destroyed, WRITE LOCKOUT should be put in the "SAFE" position. Note that the SAFE indicator on the front panel will light when the cartridge WRITE LOCKOUT is in the "SAFE" position.

It is recommended that INTERTAPE be powered prior to installing the tape. Firmly insert the cartridge into the tape drive opening located at the right-hand side of INTERTAPE, with the clear plastic of the cartridge facing to the left. Push the cartridge in until it snaps in place. When the cartridge is properly inserted, the TAPE POSITION indicator will show 0000 and the NOT READY light will go out.

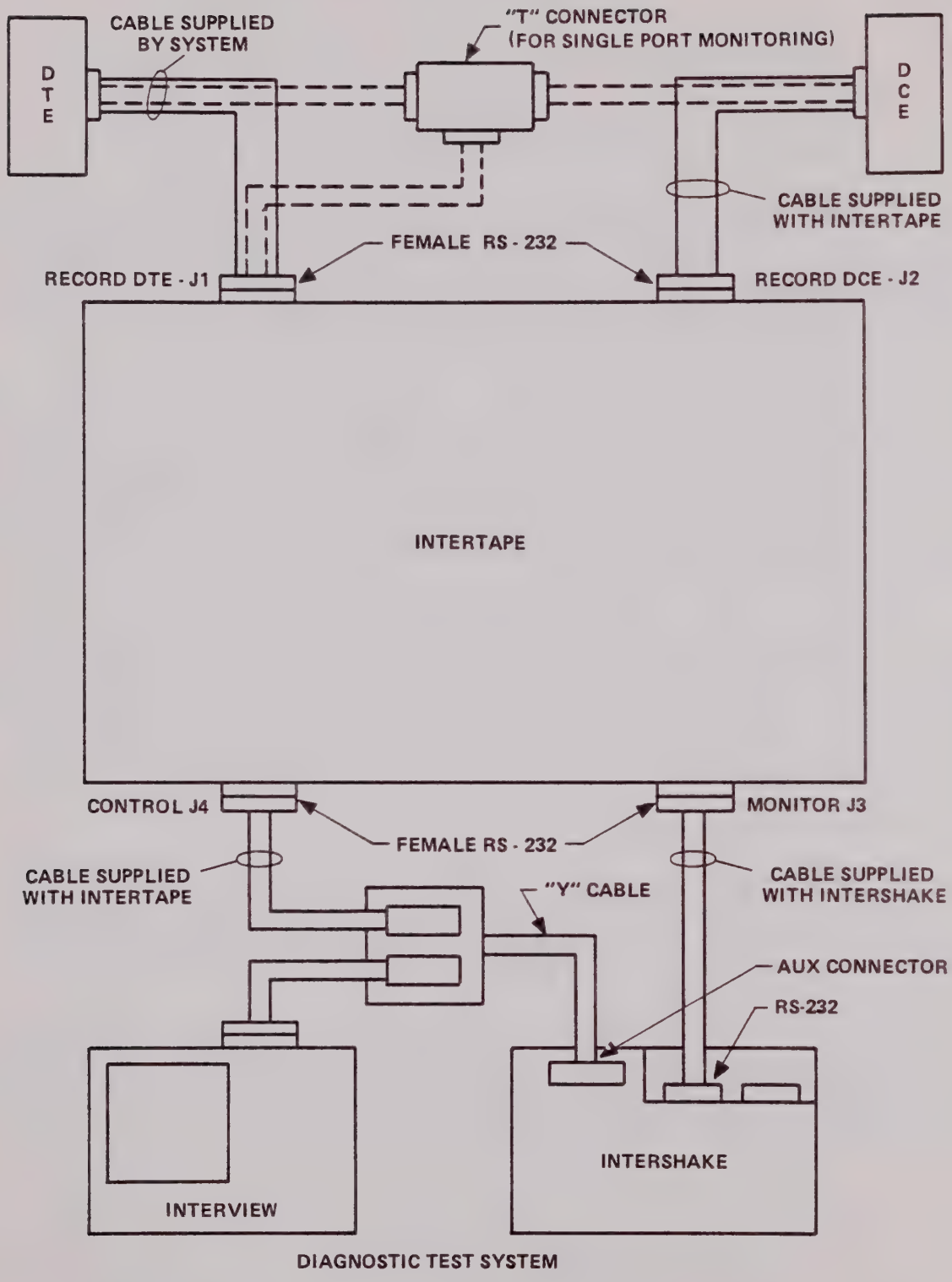


Figure 2-1. Typical System Interconnect (Manual).

To remove the cartridge, press the EJECT pushbutton on the lower right-hand corner of the front panel.

NOTES

1. Errata on Serial Numbers 1 through 6 *ONLY*. On these units jack "J2 – record DCE" is the "control" signal jack and jack J4 is a "monitor" jack.

2. The cartridge can not be removed unless INTERTAPE is powered. Do not leave cartridge in INTERTAPE with power off.

3. Operation Environment. Cartridges used for data interchange shall be operated under the following conditions:

Temperature	41 to 113°F (to to 45°C)
RH	20 to 80% non-condensing
Maximum Wet Bulb Temperature	79°F (26°C)

The cartridge shall be conditioned by exposure to the operating environment a time equal to or greater than the time away from the operating environment (up to a maximum of 8 hours). It is recommended that if the recipient of a data cartridge knows or suspects that the cartridge has been exposed to either the maximum or minimum temperature extreme, that it be *rewound one complete cycle* on the tape transport before using the cartridge for data interchange.

2.3 RECORDING OF DATA

To record data with INTERTAPE the following steps should be performed:

a. Power and cable the Unit (Paragraph 2.1).

b. Insert the cartridge (Paragraph 2.2).

c. Select the correct baud rate (Paragraph 3.4).

d. Select the MODE as either Continuous, Mark or Full (Paragraph 3.3B).

e. Set the TEST switch to OFF.

f. Position the tape to the desired position to begin recording. REWIND will position the tape to the beginning of TAPE – RECORD BLOCK 0; otherwise, the MOTION switch may be used to position the tape (Paragraph 3.1C).

g. Select if DATA or DATA plus STATUS is to be recorded, by using the RS-232 control switch (Paragraph 3.5). Pin assignment of recorded STATUS is listed in Table C-1 in Appendix C.

h. Depress the RECORD pushbutton to start recording.

i. To stop RECORD mode, depress the STOP switch.

j. If a marker is to be recorded on the tape, the manual MARKER pushbutton or EXT MARKER INPUT may be used. Note that the marker will only be recorded if the unit has the RS-232 CONTROL switch on the ON position.

2.4 REPLAY OF DATA

In order to REPLAY data with the INTERTAPE, the Unit may or may not be disconnected from the computer/terminal system being recorded. When REPLAY mode is selected the data replayed from tape is switched to the "MONITOR" connector on the back of INTERTAPE (see Figures 2-1 and 2-2). The RECORD connectors will not be affected during the REPLAY mode. The following steps should be performed to REPLAY data:

a. Power and cable the Unit (Paragraph 2.1).

b. Insert the cartridge (Paragraph 2.2).

c. Manipulate tape to the desired TAPE POSITION using the MOTION, BACKSPACE, and/or REWIND switches.

d. Set the REPLAY OUTPUT switch to the ON position.

e. Set the SEARCH switch to ON or OFF (Paragraph 3.2.B). In order to search for an event that occurred at a low baud rate INTERTAPE may be set to a higher baud rate to search out the marked data. This allows the user to position to the marked data quickly, and then to replay the data at a lower baud rate.

f. Set the BIT RATE switch to the proper baud rate.

g. Set the RS-232 CONTROL switch to the same position (ON or OFF) as when the tape was recorded.

h. Depress the REPLAY switch.

If the SEARCH switch is ON during REPLAY mode, INTERTAPE will stop, with the MARKER indicator flashing, when a MARKER has been detected. Note that in the SEARCH mode of operation, the detection of a recorded marker causes the unit to read that block of data plus *one* additional block of data, which may also have a marker. To restart REPLAY mode depress the REPLAY pushbutton.

Stopping the Unit during REPLAY mode can be performed by either the STOP pushbutton or the REPLAY OUTPUT switch set to the OFF position. The STOP pushbutton causes INTERTAPE to stop after it has completed outputting the block of data being processed. The REPLAY OUTPUT switch, in the OFF state, however, causes the unit to stop at that exact bit time. When the REPLAY OUTPUT switch is returned to the ON position, processing of the data block will continue from that point. Note that resyncing of data is required when REPLAY output or STOP control is used, since data is stopped without regard to character length.

2.5 SELF TEST OF INTERTAPE

INTERTAPE contains an internal test feature. This feature allows the user to self test 90-95% of the internal hardware of INTERTAPE, see Figure 2-2. To perform a self test the following steps should be performed.

a. Insert and rewind a tape cartridge (Paragraph 2.2).

b. Set the Data Capture Mode to TEST "ON".

c. Set the RS-232 control to ON.

d. Depress the RECORD pushbutton.

During this mode of operation an alternating pattern of ones and zeros is written on the tape. This pattern is all ones on all data and status lines for an approximate 1/3 of a second period, followed by an all zeros data and status for approximately 1/3 of a second. During both the TEST RECORD and TEST REPLAY modes the test jack indicators will reflect the alternating pattern. The following RS-232 indicators shall alternate during both modes: TD, RD, RTS, CTS, DSR, C-DET, and DTR.

NOTE

The operator should be careful when monitoring in this mode using the test jacks. These jacks, in TEST RECORD mode, continue to monitor the system being recorded and do not reflect the status displayed on the RS-232 indicators (see Figure 2-2). Also note that the MARKER input is operational during this mode and can be tested.

e. Stop the unit with the STOP pushbutton after sufficient data has been recorded.

f. If MARKERS were recorded, and are to be tested, set the SEARCH switch to the ON position.

g. REWIND the tape.

h. Depress the REPLAY pushbutton.

Again, the visual RS-232 indicators can be noted. If a SEARCH switch is used the unit should stop after detecting the MARKER. If the unit can record and replay the data, plus stop on an event, approximately 90-95% of the hardware has been self-tested. If any problems are detected, consult the warranty for INTERTAPE service.

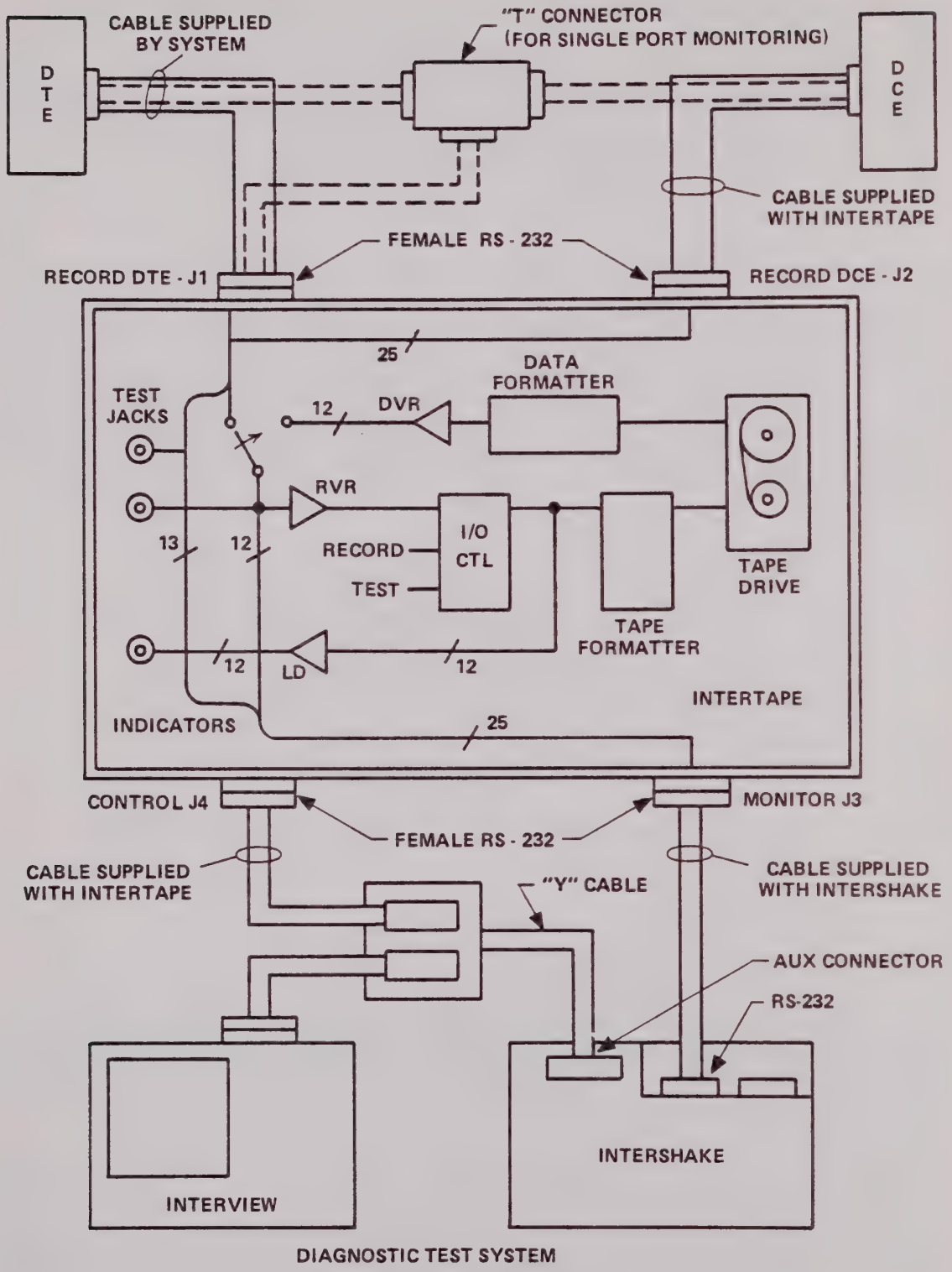


Figure 2-2. Typical Interface Signal Control.

CHAPTER 3

CONTROLS AND INDICATORS

This Chapter describes the controls and indicators on the front panel of INTERTAPE shown in Figure 3-1.

3.1 TAPE CONTROLS/INDICATORS

a. STOP – Pushbutton/Indicator

The STOP pushbutton terminates Record, Replay, or Rewind operations and restores INTERTAPE's interface to monitor the line. The STOP light indicates that the STOP mode has been selected.

b. REWIND – Pushbutton/Indicator

Depressing the REWIND pushbutton clears the TAPE POSITION indicator to zero and positions the cartridge to the beginning of the tape. The REWIND light indicates that a REWIND is in progress. INTERTAPE must be in the STOP or REPLAY mode to initiate REWIND.

NOTE

Depressing STOP during REWIND operation causes the tape to stop at an unknown position.

c. MOTION – Pushbutton – 3 Position

Putting the MOTION pushbutton in the up position moves the tape in the forward direction at high speed. Putting the MOTION pushbutton in the down position moves the tape in the reverse direction at high speed. This function can only be done in the REPLAY or STOP modes.

3.2 DATA PLAYBACK CONTROL/INDICATORS

a. REPLAY – Pushbutton/Indicator

Depressing the REPLAY pushbutton internally switches the output of the tape unit to the MONITOR connector (see Figure 3-2). The REPLAY light indicates REPLAY in progress. INTERTAPE must be in the STOP mode to initiate REPLAY.

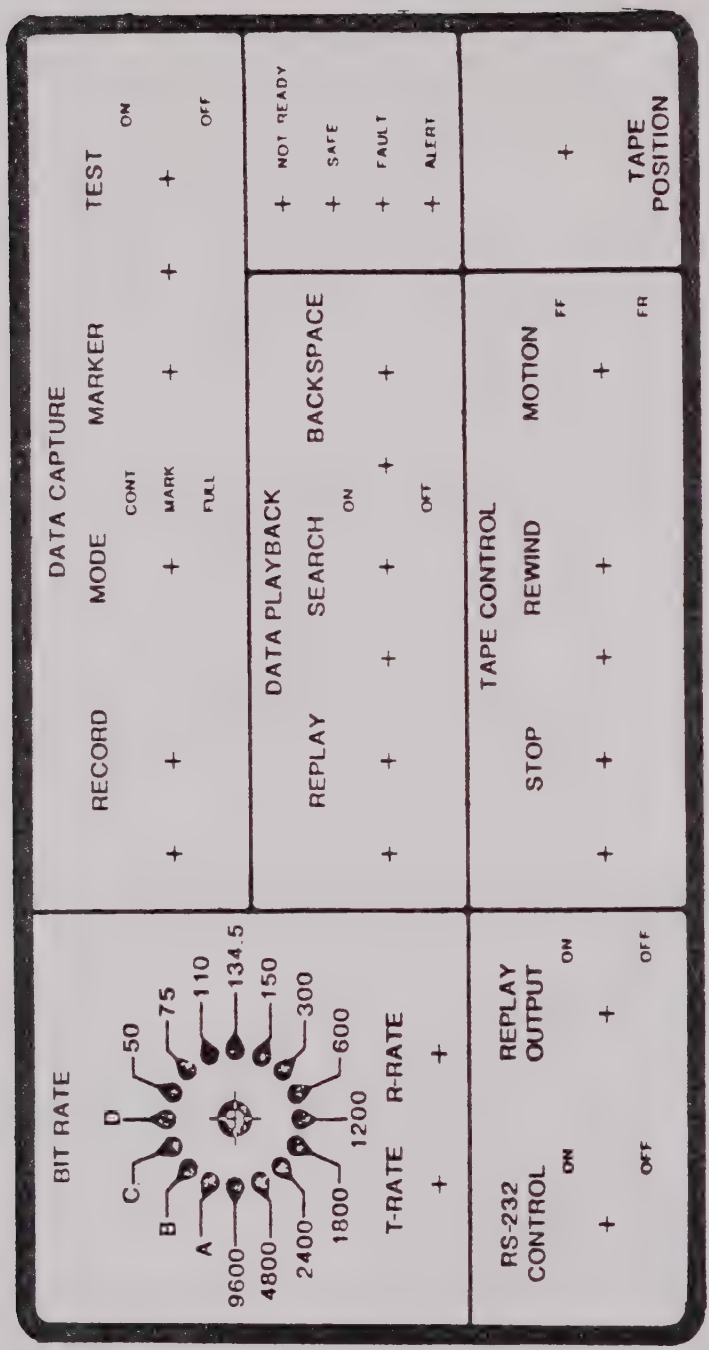


Figure 3-1. Front Panel Layout.

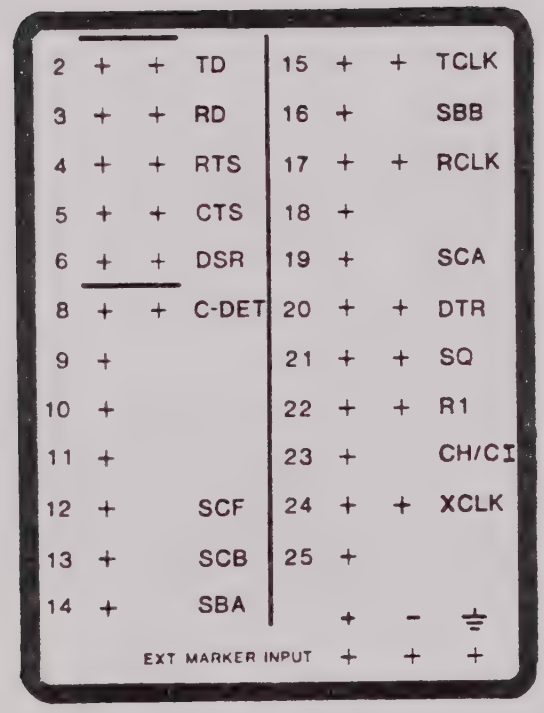


Figure 3-2. Front Panel — Monitor Interface

The starting position of the REPLAY operation is determined by using the REWIND, BACKSPACE, and/or MOTION pushbuttons. During REPLAY mode the playback data is available on the MONITOR connector at the rate selected by the BIT RATE switch.

b. SEARCH – Pushbutton/Indicator

With the SEARCH switch in the ON position, the REPLAY mode will be automatically stopped when an event marker is read from the tape or received through the External Marker Input Jack. The SEARCH indicator is illuminated when a marker is detected in either mode and will flash when the SEARCH switch is in the ON position and REPLAY mode is terminated by a marker detection.

c. BACKSPACE – Pushbutton

Depressing the BACKSPACE pushbutton causes a slow REVERSE motion of the tape with a pause between each 12K bit block of recorded data. (A single short depression of the Back Space pushbutton will cause the tape to back up one 12K bit block.) Backspace is only active in the STOP or REPLAY modes.

3.3 DATA CAPTURE CONTROLS

a.. RECORD – Pushbutton/Indicator

Depressing the RECORD pushbutton initiates the Record operation. The RECORD lamp indicates recording in progress. INTERTAPE must be in the STOP mode to initiate RECORD. When the cartridge "Write Lockout" is in the SAFE position, the SAFE indicator lights. If the RECORD pushbutton is depressed while the SAFE indicator is ON, the SAFE indicator will flash and the STOP mode will be maintained. The starting position of the RECORD operation is determined by use of the REWIND, BACKSPACE, and/or MOTION pushbutton.

b. MODE – 3-Position Switch

This switch selects the type of recording mode selected.

- In the FULL position, the Unit will record data until the end of cartridge is detected. INTERTAPE will then stop.

- In the CONT position, an endless loop format will record to retain a "Moving History" of line activity.

- In the MARK position, an event MARKER signal (either through manual operation of the MARKER pushbutton or from an external source) terminates the RECORD operation at the end of the cartridge, and the MARKER indicator will be flashing.

c. MARKER – Pushbutton/Indicator

An "Event Marker" is recorded on the tape during the time the MARKER pushbutton is held depressed. The MARKER indicator lights when the pushbutton is depressed or an EXTERNAL MARKER pulse is detected. The MARKER indicator flashes at the end of tape when the RECORD MARK mode of operation and a "MARKER" has been recorded. Note that the MARKER mode is entered only if the RS-232 control switch is in the ON position.

d. TEST – Switch

With the TEST switch in the ON position and in RECORD mode, an alternating pattern is recorded on tape. This pattern may be observed on the RS-232 lamp displays during RECORD and REPLAY to ensure that INTERTAPE is functioning properly.

3.4 BIT RATE – 16 Position Switch

The BIT RATE switch determines the internal clock rate for RECORD and REPLAY modes. The standard rates are 50, 75, 110, 134.5, 150, 300, 600, 1200, 2400, 5800, and 9600 bits per second. Positions A-D are reserved for optionally selected bit rates. The T-RATE/R-RATE indicators will light when the transmit or receive data rates vary by more than 10% from each other. When the T-RATE indicator lights, the transmit rate is at least 10% higher than the receive. Likewise, the R-RATE indicator will light when the receive rate is higher.

3.5 RS-232 CONTROL – 2 Position Switch

Recording with the RS-232 CONTROL switch in the ON position multiplexes the Tx DATA, Rx DATA and control status in the tape recording format. Recording with the RS-232 CONTROL switch in the OFF position multiplexes only the Tx DATA and Rx DATA in the tape recording format. In this mode a 50% increase in data storage capabilitily is obtained over the RECORD with CONTROL status mode (see Appendix D).

3.6 REPLAY OUTPUT – 2 Position Switch

In the OFF position this switch disables the data and status to the replay output monitor connector. This is done in REPLAY mode, thus allowing external line monitors to "freeze" a desired display without terminating the REPLAY mode.

3.7 TAPE POSITION – 4 Digit Numeric Display

A four-digit TAPE POSITION indicator provides the current record number being processed (0-9999). If the Unit is spaced backward through 0000, the unit cannot determine the tape block position and will assume 999 as a tape position and flash the "Most Significant Digit" to indicate an unknown tape block position.

3.8 TAPE INDICATORS – 4 LED's

a. NOT READY

This indicator flashes when the tape cartridge is not fully inserted or the tape EOT/BOT light sources are inoperative.

b. SAFE

This indicator lights whenever the cartridge "write lockout" is in the safe position, and flashes when RECORD mode is selected when the cartridge is in the SAFE position.

c. FAULT

This indicator lights when the tape is in an abnormal position beyond the BOT or EOT tape marks. If the condition persists after a known good tape has been inserted, then INTERTAPE has failed and should be returned for repair.

d. ALERT

This indicator lights when the tape is outside of the "early warning" mark. This normally occurs when the last record of a track is written. This condition locks out the panel and operation is continued until the tape is inside of the "early warning" mark. Any command issued while the unit is in this condition will be stored and executed after the ALERT condition has gone. Note that this is normally only seen during low baud rates when tape motion is at a minimum.

3.9 RS-232 TEST JACKS/INDICATORS.

LED displays are available for the primary (12) lines of the output monitor RS-232 interface (pins 1, 7, 9, 10, 11, 12, 13, 14, 16, 18, 19, 23, and 25 are omitted). The indicator displays the ON condition to indicate the RS-232 signal is positive.

NOTE

In TEST mode RECORD the test jacks continue to monitor the system being recorded, not the test pattern. See Figure 2-2.

3.10 EXT MARKER INPUT – Test Jacks

Two additional jacks are available to accept external EIA/TTL signals for generating markers on either the rising (+) or falling (–) edges of external marker signals. In the RECORD mode the external signals will be recorded on the tape the same as the MARKER pushbutton. In the REPLAY mode the external signal terminates REPLAY when the SEARCH submode is selected.

CHAPTER 4

AUTOMATIC CONTROL BY INTERSHAKE (DTM-2)

4.1 GENERAL DESCRIPTION

The Remote Control Interface (J4) permits Diagnostic Equipment such as INTERSHAKE (DTM) to control INTERTAPE automatically. Provision has been made to Record, Record a Marker, Stop, Rewind, Replay, and Pause during Replay under Remote Control. In addition to the Remote Control inputs, output signals are provided to indicate various status conditions.

By using the DTM to Control INTERTAPE and monitor a data channel, INTERTAPE can record in the CONTINUOUS mode until an error condition or other point of interest occurs. The DTM can then decide whether to record a MARKER, STOP, continue recording a number of data blocks following the error and then STOP, sound an alarm to the operator, etc., depending on the type of error condition and the DTM test program.

Once data has been recorded, the DTM can control the INTERTAPE to alternately REWIND and REPLAY for recursive measurements on the same data sample. If INTERVIEW is being used with INTERSHAKE for visual analysis of the data, the Remote Control Pause can be used to FREEZE the INTERVIEW display and temporarily stop INTERTAPE at any point of interest. By using the PAUSE mode, which freezes the REPLAY data and clock signals from INTERTAPE, the DTM and INTERVIEW can stay in Sync and REPLAY can continue without resyncing (e.g. without rewinding and restarting from two sync characters).

The Front Panel manual controls are active at all times and may be used to override the Remote Control Interface.

4.2 REMOTE CONTROL SIGNAL DESCRIPTION

Remote Control Connector J4

INPUTS

Pin 1	GND	Signal Ground for INTERTAPE. This signal is also common to the RS-232 Interface Pin 7. GND may be connected to Pin 14 $\overline{\text{ENABLE}}$ to indicate to INTERTAPE that a connector is present on J4 and the Remote Control interface logic in INTERTAPE is to be activated.
Pin 14	$\overline{\text{ENABLE}}$	A logic "0" TTL level on this pin indicates to INTERTAPE that a connector is present on J4 and the Remote Control interface is to be activated. The Remote Control interface logic in INTERTAPE is activated 2.5 sec. + 0.5 sec. after the low level is sensed on Pin

14. This delay ensures that all the pins in J4 have been connected prior to activating the Remote Control interface logic and allows J4 to be connected with power on INTERTAPE without false Remote Control commands.

Pin 2 PAUSE

During REPLAY a logic "1" TTL level on this pin will force the RS-232 clock signals (EIA RS-232 pins 15, 17, and 24) to a low state. This signal is used to inhibit the REPLAY data output from INTERTAPE. To ensure proper clocking this signal should only go positive when the RS-232 clock signals (EIA RS-232 pins 15, 17, and 24) are in a low state, i.e., during the last half of a REPLAY data output bit from INTERTAPE.

Pin 15 STOP

Remote Control STOP. A positive TTL pulse (minimum one microsecond) on this pin will terminate the RECORD or REPLAY modes. If the tape drive is not in motion when the STOP command is issued the RECORD or REPLAY mode is terminated upon receiving the command; however, if the tape drive is in motion the RECORD or REPLAY mode is terminated when the next tape gap is detected. (RECORD or REPLAY tape motion may be sensed on Pin 5 of the Remote Control interface).

Pin 3 RECORD MARKER

A positive TTL level (minimum one bit time) on this pin during the RECORD mode will result in a MARKER being recorded on tape for the duration of the positive level. To ensure that the MARKER has been written on tape, Pin 5 $\overline{\text{MOTION}}$ must be tested for a high, low, high sequence following the trailing edge of Pin 3 RECORD MARKER.

A positive level (minimum one bit time) on Pin 3 RECORD MARKER during the REPLAY/SEARCH mode will result in automatic termination of the REPLAY mode; however, INTERTAPE front panel intervention is required to resume the REPLAY mode by operating the REPLAY switch. To resume Remote Control operation, the STOP switch must be operated. Pin 2 PAUSE is recommended as the temporary stop control for the REPLAY mode.

Pin 16 RECORD

Remote Control RECORD. A positive TTL pulse (minimum one microsecond) on this pin will initiate the RECORD mode in INTERTAPE. Prior to issuing

this command Pin 6 $\overline{\text{BUSY}}$ and Pin 19 SAFE must be tested to determine if INTERTAPE will respond to the RECORD command. Pin 6 must be high and Pin 19 must be low for INTERTAPE to respond to the RECORD command. Pin 6 $\overline{\text{BUSY}}$ will go low immediately after the command is accepted and should be tested to ensure the RECORD mode has been initiated.

Pin 4 REPLAY

Remote Control REPLAY. A positive TTL pulse (minimum one micro second) on this pin will initiate the REPLAY mode in INTERTAPE. Prior to issuing this command Pin 6 $\overline{\text{BUSY}}$ must be tested to determine if INTERTAPE will respond to this command Pin 6 must be high for INTERTAPE to respond to the REPLAY command. Pin 6 $\overline{\text{BUSY}}$ will go low immediately after the command is accepted and should be tested to ensure the REPLAY mode has been initiated.

Pin 17 REWIND

Remote Control REWIND. A positive TTL pulse (minimum one microsecond) on this pin will initiate the REWIND mode in INTERTAPE. Prior to issuing this command Pin 6 $\overline{\text{BUSY}}$ must be tested to determine if INTERTAPE will respond to this command. Pin 6 must be high for INTERTAPE to respond to the REWIND command. Pin 6 $\overline{\text{BUSY}}$ will go low when the command is accepted and should be tested to ensure the REWIND mode has been initiated. When the REWIND function has been completed Pin 6 $\overline{\text{BUSY}}$ will go high indicating that INTERTAPE is ready for the next Remote Control command.

OUTPUTS

Pin 5 $\overline{\text{MOTION}}$

This pin is driven to a TTL low level by INTERTAPE when RECORD or REPLAY tape motion is in process, i.e., when data is actually being written onto or read from tape. This signal is to be used as a test to ensure that the data of interest has been written on tape prior to issuing a STOP command. The data of interest must be followed by a high, low, high sequence on Pin 5 $\overline{\text{MOTION}}$ prior to issuing a STOP command.

Pin 18 $\overline{\text{REPLAY MARKER}}$

This pin will go to a TTL low level for the duration of a MARKER retrieved from tape during the REPLAY mode.

Pin 6	$\overline{\text{BUSY}}$	INTERTAPE Busy. This pin will go to a TTL low level when INTERTAPE is in any mode other than STOP. This pin must be tested for a high TTL level prior to initiating any of the following commands: A. Pin 16 RECORD B. Pin 4 REPLAY C. Pin 17 REWIND and should be tested for a low TTL level immediately after issuing each of the above commands to ensure that INTERTAPE did respond to the command. This pin will also go to a low TTL level if a STOP command is issued while in the STOP mode. It will remain low until after the STOP input returns to a low level.
Pin 19	SAFE	A TTL high level on this pin indicates that the SAFE button on the tape cartridge is in the SAFE or "ON" position and recording on tape is prohibited, thus a Pin 16 RECORD command will be ignored by INTERTAPE.

4.3 DTM-2 REMOTE CONTROL FUNCTIONS

DTM Peripheral Controller Function 94 is used to control INTERTAPE. The DTM to ITU Remote Control Cable connects the DTM Aux Interface to INTERTAPE's Remote Control connector (J4). Table 4-1 lists the Remote Control Cable wiring pin-to-pin and the DTM Function 94 Flag assignments. The START switch on DTM initializes all of the Peripheral Controller Flag Outputs to a logic 0 which is the inactive state for all of the INTERTAPE Remote Control Inputs.

The mode select inputs for STOP, RECORD, REWIND, and REPLAY will respond to a pulse of at least one microsecond duration which is equivalent to setting an Output Flag to "1" and then setting it to "0" with the next program step (this produces a pulse of approximately 3 microseconds duration). These inputs are latched and then scanned by the Remote Control Interface logic approximately every 70 milliseconds. While a "one shot" pulse is adequate for any of these Remote Control commands, it is necessary for the DTM Program to "know" exactly what INTERTAPE is doing in order to execute a sequence of commands correctly. For example, to STOP, REWIND, and then REPLAY, the DTM must know that the STOP command has been recognized and executed before issuing a REWIND command. The REWIND command may take up to 35 seconds to complete and the DTM must know that the REWIND function has been initiated and must wait until it is completed before issuing the REPLAY command. In order to preserve the proper sequence, it is recommended that the following "subroutines" be used to control INTERTAPE. Each of the command subroutines tests $\overline{\text{BUSY}}$ as a Peripheral Controller Flag Input to ensure that the command has been recognized and executed before going to the next step of the program.

Table 4-1. DTM-2 To Intertape Remote Control Cable

DTM-2		ITU	
FUNCTION	AUX INTERFACE Pin No.	REMOTE CONTROL J4 Pin No.	FUNCTION
SIGNAL GROUND	63	1	GND
SIGNAL GROUND	84	14	$\overline{\text{ENABLE}}$
FUNCTION 94 FLAG OUTPUT 6	67	2	PAUSE
FUNCTION 94 FLAG OUTPUT 4	69	15	STOP
FUNCTION 94 FLAG OUTPUT 5	68	3	MARKER (INPUT)
FUNCTION 94 FLAG OUTPUT 7	66	16	RECORD
FUNCTION 94 FLAG OUTPUT 2	71	4	REPLAY
FUNCTION 94 FLAG OUTPUT 1	72	17	REWIND
FUNCTION 94 FLAG INPUT 4	61	5	$\overline{\text{MOTION}}$
FUCNTION 94 FLAG INPUT 5	62	18	$\overline{\text{MARKER (OUTPUT)}}$
FUNCTION 94 FLAG INPUT 6	64	6	$\overline{\text{BUSY}}$
FUNCTION 94 FLAG INPUT 7	65	19	SAFE
SIGNAL GROUND	104	20	GND

REWIND — **FUNCTION 94 FLAG OUTPUT 1**

STEP	DATA	FUNCTION	DESCRIPTION
N	11	94	Set FLAG OUTPUT 1 REWIND to 1
N+1	**	41	Preset Jump to This Step
N+2	63	94	Jump If FLAG INPUT 6 $\overline{\text{BUSY}}$ = 1
N+3	10	94	Set FLAG OUTPUT 1 REWIND to 0
N+4	**	41	Preset Jump to This Step
N+5	62	94	Jump If FLAG INPUT 6 $\overline{\text{BUSY}}$ = 0

REPLAY — **FUNCTION 94 FLAG OUTPUT 2**

STEP	DATA	FUNCTION	DESCRIPTION
N	21	94	Set FLAG OUTPUT 2 REPLAY to 1
N+1	**	41	Preset Jump to This Step
N+2	63	94	Jump If FLAG INPUT 6 $\overline{\text{BUSY}}$ = 0
N+3	20	94	Set FLAG OUTPUT 2 REPLAY to 0

STOP — **FUNCTION 94 FLAG OUTPUT 4**

STEP	DATA	FUNCTION	DESCRIPTION
N	41	94	Set FLAG OUTPUT 4 STOP to 1
N+1	**	41	Preset Jump to This Step
N+2	63	94	Jump If FLAG INPUT 6 $\overline{\text{BUSY}}$ = 1
N+3	40	94	Set FLAG OUTPUT 4 to 0
N+4	**	41	Preset Jump to This Step
N+5	62	94	Jump IF FLAG INPUT 6 $\overline{\text{BUSY}}$ = 0

RECORD MARKER — **FUNCTION 94 FLAG OUTPUT 5**

STEP	DATA	FUNCTION	DESCRIPTION
N	51	94	SET FLAG OUTPUT 5 MARKER to 1 Minimum MARKER Duration is One Bit Period
N+. . .	50	94	Set FLAG OUTPUT 5 MARKER to 0

The MARKER may also be assigned to automatically occur if RLSD is OFF, if a parity error is detected, or if the DTM DETECT TEST POINT senses +12V or ON.

STEP	DATA	FUNCTION	DESCRIPTION
N	5A	94	RLSD OFF = MARKER ON FOR DURATION
N	5B	94	DETECT TP ON = MARKER ON FOR DURATION
N	5C	94	PARITY ERROR = MARKER ON FOR 1 CHARACTER PERIOD

PAUSE — **FUNCTION 94 FLAG OUTPUT 6**

STEP	DATA	FUNCTION	DESCRIPTION
N	61	94	Set FLAG OUTPUT 6 PAUSE to 1

This step should follow a function such as FUNCTION 16 WAIT TIL = CHARACTER or any Trap, or Wait N Characters, or Log Function to ensure proper clocking of data when REPLAY resumes. In order to PAUSE without loosing SYNC, the PAUSE command must occur while the data clock (Pins 15, 17 & 24) is low, i.e. after the 50% point of any data bit.

To resume REPLAY,

STEP	DATA	FUNCTION	DESCRIPTION
N	6	94	Set FLAG OUTPUT 6 PAUSE to 0

RECORD — **FUNCTION 94 FLAG OUTPUT 7**

STEP	DATA	FUNCTION	DESCRIPTION
N	71	94	Set FLAG OUTPUT 7 RECORD to 1
N+1	**	41	Preset Jump to This Step
N+2	63	94	Jump IF FLAG INPUT 6 $\overline{\text{BUSY}}$ = 1
N+3	70	94	Set FLAG OUTPUT 7 RECORD to 0

MOTION — **FUNCTION 94 FLAG INPUT 4**

This subroutine is used to test for a HI, LO, HI sequence on the $\overline{\text{MOTION}}$ FLAG which indicates that data of interest has now been written onto the tape.

STEP	DATA	FUNCTION	DESCRIPTION
N	**	41	Preset Jump to This Step
N+1	42	94	Jump IF FLAG INPUT 4 $\overline{\text{MOTION}}$ = 0
N+2	**	41	Preset Jump to This Step
N+3	43	94	Jump IF FLAG INPUT 4 $\overline{\text{MOTION}}$ = 1
N+4	**	41	Preset Jump to This Step
N+5	42	94	Jump IF FLAG INPUT 4 $\overline{\text{MOTION}}$ = 0

MARKER — **FUNCTION 94 FLAG INPUT 5**

To wait until a MARKER is detected during REPLAY

STEP	DATA	FUNCTION	DESCRIPTION
N	**	41	Preset Jump to This Step
N+1	53	94	Jump IF FLAG INPUT 5 MARKER = 1

BUSY — FUNCTION 94 FLAG INPUT 6

To wait until INTERTAPE is not busy:

STEP	DATA	FUNCTION	DESCRIPTION
N	**	41	Preset Jump to This Step.
N+1	62	94	Jump IF FLAG INPUT 6 $\overline{\text{BUSY}}$ = 0

To wait until INTERTAPE is busy:

STEP	DATA	FUNCTION	DESCRIPTION
N	**	41	Preset Jump to This Step
N+L	63	94	Jump IF FLAG INPUT 6 $\overline{\text{BUSY}}$ = 1

SAFE — FUNCTION 94 FLAG INPUT 7

To test the SAFE button on the tape cartridge and jump to a "SAFE" subroutine if recording is prohibited:

STEP	DATA	FUNCTION	DESCRIPTION
N	**	41	Preset Jump To "SAFE" Subroutine
N+1	63	94	Jump IF FLAG INPUT 7 SAFE = 1

4.4 APPLICATION PROGRAM INTERTAPE TEST

This program uses the DTM to exercise INTERTAPE and tests the entire Remote Control Interface. The program also tests the RECORD and REPLAY functions for accuracy by using CRC error checking. Data blocks of 800 characters each are recorded along with check characters which are tested during REPLAY. Any errors detected are counted by the DTM. Time required for the program to test 1000 blocks is approximately 40 minutes.

SETUP

(1) Connect DTM Modem Connector to Intertape "Monitor" Connector.

(2) Connect DTM Control Cable to Intertape "Control" Connector.

(3) Load Intertape Test Program into DTM.

(4) Set DTM to 9600 Baud, Synchronous, 8 Data Bits, no Parity. Set DTM counter to count BCC Errors in 10^3 Blocks.

(5) Set Intertape to 9600 Baud, "Mode" Switch to "Full", "Search" Switch to "OFF" "RS-232 Control" to "ON", and "Replay Output" to "ON".

TEST

(1) Turn arrow on Tape Cartridge to "SAFE". Insert Cartridge into INTERTAPE and start DTM. Alarm should sound a single tone repeated.

(2) Remove Cartridge from recorder - Eject button is in lower right corner of panel below the Cartridge Window.

(3) Turn arrow on Tape Cartridge to point away from "SAFE". Insert Cartridge into INTERTAPE and start DTM. INTERTAPE should REWIND and then go into RECORD mode.

(4) The DTM is now recording data blocks on the tape. The TD LED on INTERTAPE should be following the data. The Test Program records 396 blocks which will take about 5 minutes. During this time INTERTAPE will record track 1, reverse direction and record track 2, then reverse again and start recording on track 3. At the end of 396 blocks, a MARKER will be recorded and then the recorder will REWIND.

(5) When REWIND is completed, INTERTAPE should go into the REPLAY mode. The DTM will now test each block for CRC errors until it reaches the MARKER recorded on the tape.

(6) When the MARKER is reached, INTERTAPE will REWIND and then go into the RECORD mode.

(7) The Test Program will repeat the RECORD and REPLAY cycles until the DTM counter reaches "END" indicating 10^3 blocks have been tested. This will occur about half way thru the third replay cycle. When "END" is reached, the recorder will STOP and the alarm will sound a double tone repeated.

INTERTAPE TEST FLOW SEQUENCE

"START"

FILL CHAR = FF

SYN = 32

INTERRUPT ON COUNTER "END" ⟶ "END"

JUMP IF SAFE ⟶ "SAFE"

"STOP"

"REWIND"

"RECORD"

TEST MODEM, INTERNAL CLOCK

SET LOOP COUNTER = 99

SEND DATA BLOCK WITH CRC

WAIT 100 MSEC ⟶ "DIVIDE BY 4" ≠ 4

JUMP UNTIL 99 LOOPS ⟵ = 4

JUMP

WAIT 100 MSEC

JUMP

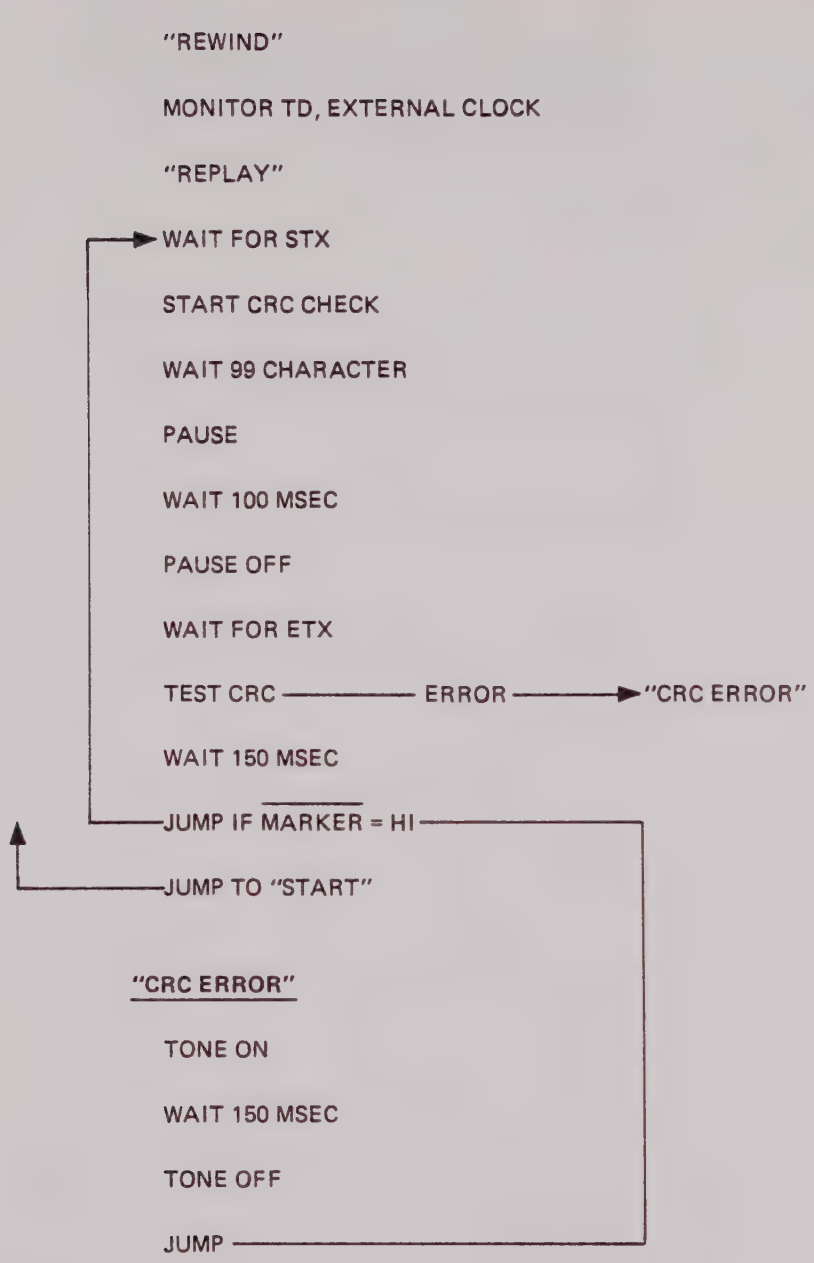
MARKER 100 MSEC

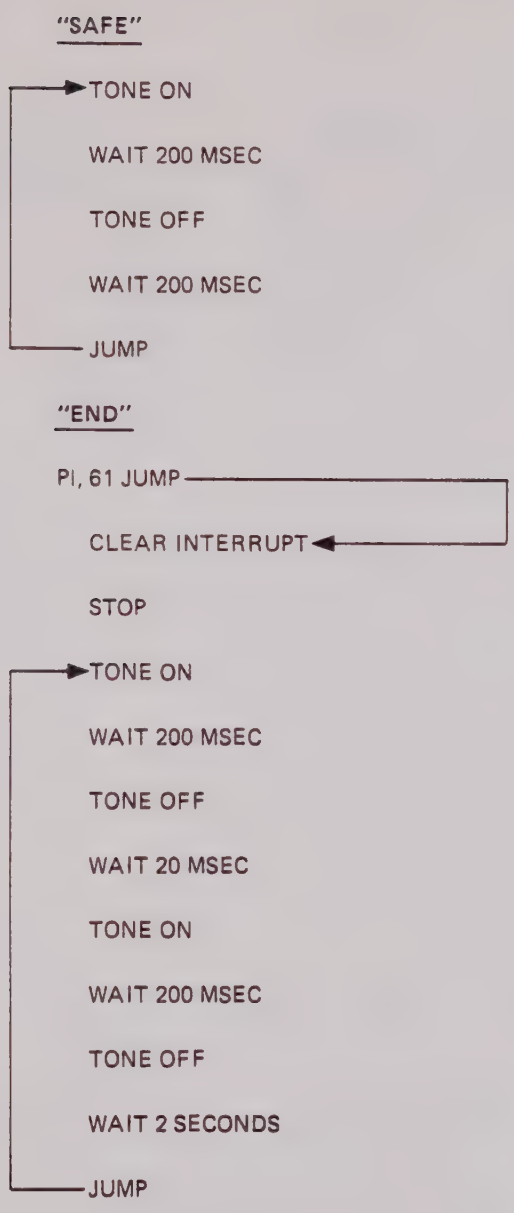
"TEST $\overline{\text{MOTION}}$ = HI"

"TEST $\overline{\text{MOTION}}$ = LO"

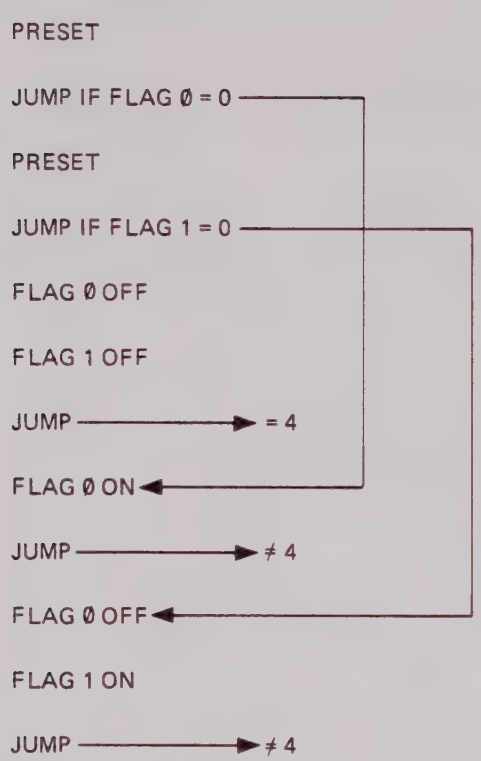
"TEST $\overline{\text{MOTION}}$ = HI"

"STOP"


"REWIND"
MONITOR TD, EXTERNAL CLOCK
"REPLAY"
WAIT FOR STX
START CRC CHECK
WAIT 99 CHARACTER
PAUSE
WAIT 100 MSEC
PAUSE OFF
WAIT FOR ETX
TEST CRC
ERROR
"CRC ERROR"
WAIT 150 MSEC
JUMP IF MARKER = HI
JUMP TO "START"
"CRC ERROR"
TONE ON
WAIT 150 MSEC
TONE OFF
JUMP


"SAFE"
TONE ON
WAIT 200 MSEC
TONE OFF
WAIT 200 MSEC
JUMP
"END"
PI, 61 JUMP
CLEAR INTERRUPT
STOP
TONE ON
WAIT 200 MSEC
TONE OFF
WAIT 20 MSEC
TONE ON
WAIT 200 MSEC
TONE OFF
WAIT 2 SECONDS
JUMP

"DIVIDE BY 4"


PRESET
JUMP IF FLAG Ø = 0
PRESET
JUMP IF FLAG 1 = 0
FLAG Ø OFF
FLAG 1 OFF
JUMP
= 4
FLAG Ø ON
JUMP
≠ 4
FLAG Ø OFF
FLAG 1 ON
JUMP
≠ 4

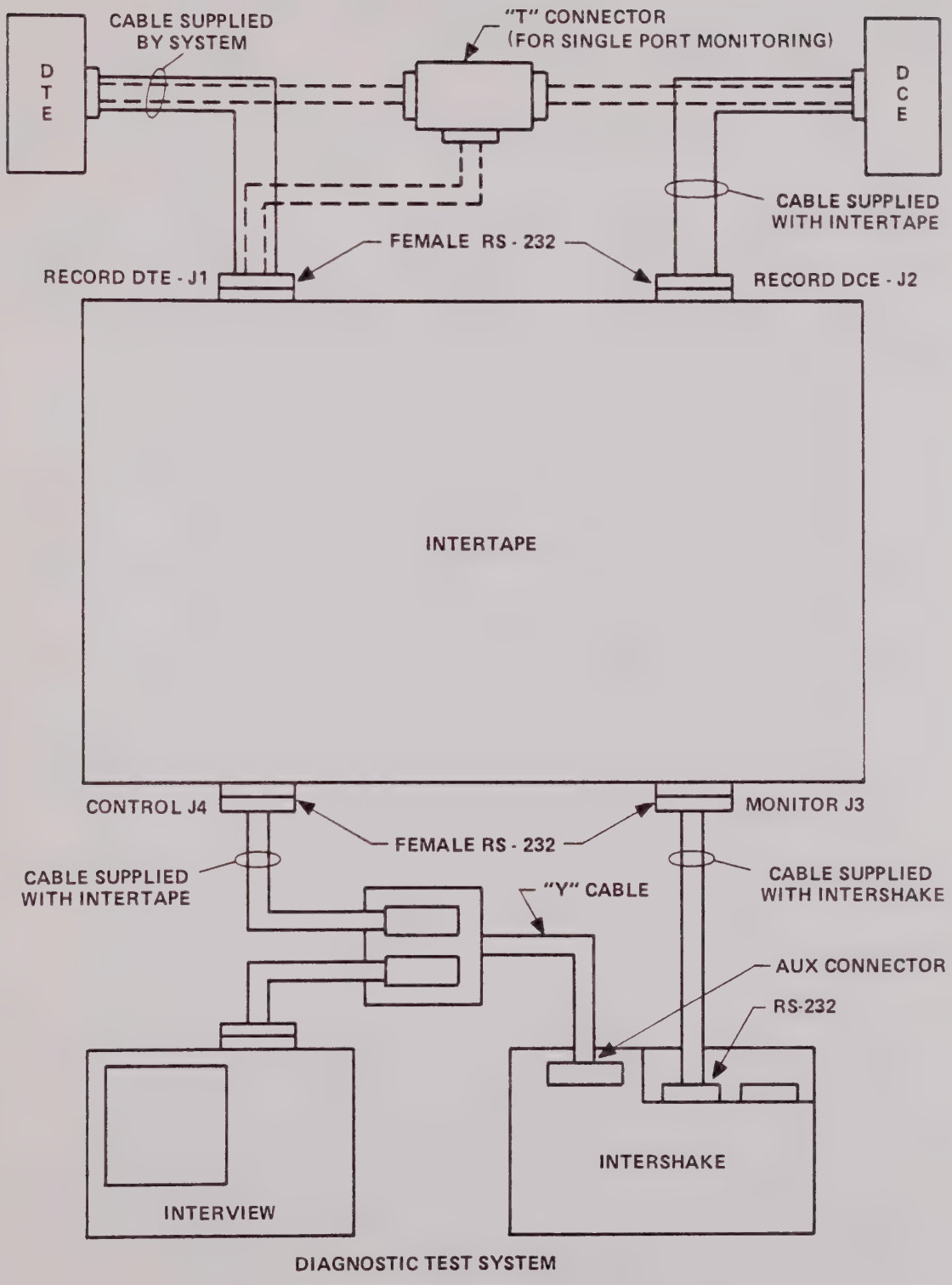


Figure 4-1. Interconnect with DTM-2 Control (Automatic).

INTERSHAKE II PROGRAM

TITLE: INTERTAPE TEST

FILE NO.

SHEET 1 OF 1

DESCRIPTION

OBJECTIVE.

ADDRESS PAGE (CIRCLE ONE) 3 2 1 (0)		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP
C 8 4 0	0	0	FF	57	FILL CHARACTER = FF	←
	1	1	32	90	SYNC CHARACTER = 32	
	2	2	0B	97	INTERRUPT ON COUNTER "END" Page 1, Step 61	
	3	3	60	41	PRESET JUMP TO "SAFE"	
	4	4	73	94	JUMP IF SAFE = 1 → SAFE	→
	5	5	41	94	FLAG 4 ON	
0	6	6	06	41	PRESET ←	
	7	7	63	94	JUMP IF $\overline{BUSY}$ = 1 — STOP	
	8	8	40	94	FLAG 4 OFF	
0	9	9	09	41	PRESET ←	
	A	10	62	94	JUMP IF $\overline{BUSY}$ = 0	
	B	11	11	94	FLAG 1 ON	
0	C	12	0C	41	PRESET ←	
	D	13	63	94	JUMP IF $\overline{BUSY}$ = 1 — REWIND	
	E	14	10	94	FLAG 1 OFF	
0	F	15	0F	41	PRESET ←	
D 9 5 1	0	16	62	94	JUMP IF $\overline{BUSY}$ = 0	
	1	17	71	94	FLAG 7 ON	
1	2	18	12	41	PRESET ← — RECORD	
	3	19	63	94	JUMP IF $\overline{BUSY}$ = 1	
	4	20	70	94	FLAG 7 OFF	
	5	21	F7	93	TEST MODEM, INTERNAL CLOCK	
	6	22	99	42	DO 99 LOOPS	
1	7	23	32	50	SEND SYN	←
	8	24	32	50	SEND SYN	
	9	25	32	50	SEND SYN	
	A	26	02	50	SEND STX	
	B	27	00	58	START CRC CALCULATION	
	C	28	10	63	SEND MESSAGE 10 TIMES	
	D	29	03	50	SEND ETX	
	E	30	00	59	SEND CRC	
	F	31	10	81	WAIT 100 MSEC	

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

- CODE: EBCDIC
- SPEED: 9600
- ASYNC / (SYNC)
- SYN CHARACTER: 32
- STOP BIT: 1.0 , 1.5 , 2.0
- INFO BITS: 5 , 6 , 7 , (8)
- PARITY: (NONE) , ODD , EVEN
- CONTROL EIA / (OFF)
- ON-LINE: TD/RD , (TD) , RD
- OFF-LINE: TERM / MODEM
- MON SIGS (NORMAL)
- PATCH CORDS
- CONTROL EIA (V. 24)
- COUNTER ZONE: BCC ERRORS
- INTERRUPTS: COUNTER END
- FLAGS
- LATCH

CONTINUE ON OTHER SIDE

ATLANTIC RESEARCH CORP.
ALEXANDRIA, VA. 22314 (703) 354-3400

CONTINUE ON OTHER SIDE

Figure 4-2. INTERTAPE Test Application Program.

2 of 4

ADDRESS PAGE (CIRCLE ONE) 3 2 1 (0)		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →	ADDITIONAL INFORMATION (WRITE IN)
E A 6 2	0	32	27	41	PRESET		
	1	33	02	47	JUMP IF FLAG Ø = 0		
	2	34	29	41	PRESET		
	3	35	12	47	JUMP IF FLAG 1 = 0		
	4	36	00	47	FLAG Ø OFF		
	5	37	10	47	FLAG 1 OFF		
	6	38	2C	40	JUMP		
2	7	39	01	47	FLAG Ø ON		
	8	40	2F	40	JUMP		
2	9	41	00	47	FLAG Ø OFF		
	A	42	11	47	FLAG 1 ON		
	B	43	2F	40	JUMP		
2	C	44	2F	41	PRESET		
	D	45	00	43	JUMP UNTIL 99 LOOPS		
	E	46	31	40	JUMP TO "MARKER"		
2	F	47	10	81	WAIT 100 MSEC		
F B 7 3	0	48	17	40	JUMP TO BEGINNING OF LOOP Page 0, Step 23	→	
	1	49	51	94	FLAG 5 ON (RECORD MARKER)		
	2	50	10	81	WAIT 100 MSEC		
	3	51	50	94	FLAG 5 OFF		
3	4	52	34	41	PRESET		
	5	53	42	94	JUMP IF $\overline{\text{MOTION}}$ = 0		
3	6	54	36	41	PRESET		
	7	55	43	94	JUMP IF $\overline{\text{MOTION}}$ = 1		
3	8	56	38	41	PRESET		
	9	57	42	94	JUMP IF MOTION = 0		
	A	58	41	94	FLAG 4 ON		
3	B	59	3B	41	PRESET		
	C	60	63	94	JUMP IF $\overline{\text{BUSY}}$ = 1 (STOP)		
	D	61	40	94	FLAG 4 OFF		
3	E	62	3E	41	PRESET		
	F	63	62	94	JUMP IF $\overline{\text{BUSY}}$ = 0		

ADDITIONAL REMARKS

PROGRAM LOCATION
DTM S/N
CELL
RAM
PROM

PROGRAM WRITTEN BY: DATE

COMPANY NAME: ATLANTIC RESEARCH CORPORATION TEL. NO.

ADDRESS:

FORM NO. TP-139-3-77

Figure 4-2. (Continued).

INTERSHAKE II PROGRAM

TITLE

FILE NO.
SHEET 3 OF 4

DESCRIPTION:

OBJECTIVE

ADDRESS PAGE (CIRCLE ONE) 3 2 (1) 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C 8 4 0	0	0	11	94	FLAG 1 ON	
4	1	1	41	41	PRESET	
	2	2	63	94	JUMP IF $\overline{BUSY}$ = 1 (REWIND)	
	3	3	10	94	FLAG 1 OFF	
4	4	4	44	41	PRESET	
	5	5	62	94	JUMP IF $\overline{BUSY}$ = 0	
	6	6	02	98	SKIP	
	7	7	BB	93	TEST TD, EXTERNAL CLOCK	
	8	8	21	94	FLAG 2 ON	
4	9	9	49	41	PRESET (REPLAY)	
	A	10	63	94	JUMP IF $\overline{BUSY}$ = 1	
	B	11	20	94	FLAG 2 OFF	
	C	12	02	98	SKIP	
4	D	13	02	16	WAIT FOR STX	←
	E	14	00	38	START CRC	
	F	15	99	14	WAIT 99 CHARACTERS	
D 9 5 1	0	16	61	94	FLAG 6 ON "PAUSE"	
	1	17	10	81	WAIT 100 MSEC	
	2	18	60	94	FLAG 6 OFF "PAUSE OFF"	
	3	19	03	16	WAIT FOR ETX	
	4	20	5C	41	PRESET JUMP TO "CRC ERROR" Page 1, Step 28	→
	5	21	00	39	TEST CRC	
	6	22	15	81	WAIT 150 MSEC	
5	7	23	4D	41	PRESET JUMP TO TEST NEXT BLOCK	←
	8	24	53	94	JUMP IF MARKER = 1 Page 1, Step 13	→
	9	25	00	40	JUMP TO START Page 0, Step 00	→
	A	26	00	00		
	B	27	00	00		
5	C	28	01	70	TONE ON "CRC ERROR"	←
	D	29	15	81	WAIT 150 MSEC	
	E	30	01	71	TONE OFF	
	F	31	57	40	JUMP TO TEST FOR MARKER Page 1, Step 23	→

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

- CODE
- SPEED
- ASYNC / SYNC
- SYN CHARACTER
- STOP BIT 1.0 , 1.5 , 2.0
- INFO BITS 5 , 6 , 7 , 8
- PARITY NONE , ODD , EVEN
- CONTROL EIA / OFF
- ON-LINE TD/RD , TD , RD
- OFF-LINE TERM / MODEM
- MON SIGS / NORMAL
- PATCH CORDS
- CONTROL EIA (V. 24)
- COUNTER ZONE
- INTERRUPTS
- FLAGS
- LATCH

CONTINUE ON OTHER SIDE

ATLANTIC RESEARCH CORP.
ALEXANDRIA, VA. 22314 (703) 354-3400

CONTINUE ON OTHER SIDE

Figure 4-2. (Continued).

4 of 4

ADDRESS PAGE (CIRCLE ONE) 3 2 (1) 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →	ADDITIONAL INFORMATION (WRITE IN)
E A 6 2	0	32	01	70	TONE ON	←	
	1	33	20	81	WAIT 200 MSEC		
	2	34	01	71	TONE OFF		
	3	35	20	81	WAIT 200 MSEC		
	4	36	60	40	JUMP		
	5	37	00	00			
	6	38	00	00			
	7	39	00	00			
	8	40	00	00			
6	9	41	08	97	CLEAR INTERRUPT	←	
	A	42	41	94	FLAG 4 ON		
6	B	43	6B	41	PRESET		
	C	44	63	94	JUMP IF $\overline{BUSY}$ = 1		
	D	45	40	94	FLAG 4 OFF		
6	E	46	6E	41	PRESET		
	F	47	62	94	JUMP IF $\overline{BUSY}$ = 0		
F B 7 3	0	48	02	98	SKIP		
7	1	49	01	70	TONE ON		
	2	50	20	81	WAIT 200 MSEC		
	3	51	01	71	TONE OFF		
	4	52	20	80	WAIT 20 MSEC		
	5	53	01	70	TONE ON		
	6	54	20	81	WAIT 200 MSEC		
	7	55	01	71	TONE OFF		
	8	56	20	82	WAIT 2 SECONDS		
	9	57	71	40	JUMP		
	A	58	00	00			
	B	59	00	00			
	C	60	00	00			
	D	61	69	40	JUMP TO "END" Page 1, Step 41	→	
	E	62	00	00			
	F	63	00	00			

"SAFE" (steps 0–4)

"END" (step 9)

STOP (steps A–F)

ADDITIONAL REMARKS

PROGRAM LOCATION
DTM S/N
CELL
RAM
PROM

PROGRAM WRITTEN BY: DATE

COMPANY NAME: ATLANTIC RESEARCH CORPORATION TEL. NO.

ADDRESS:

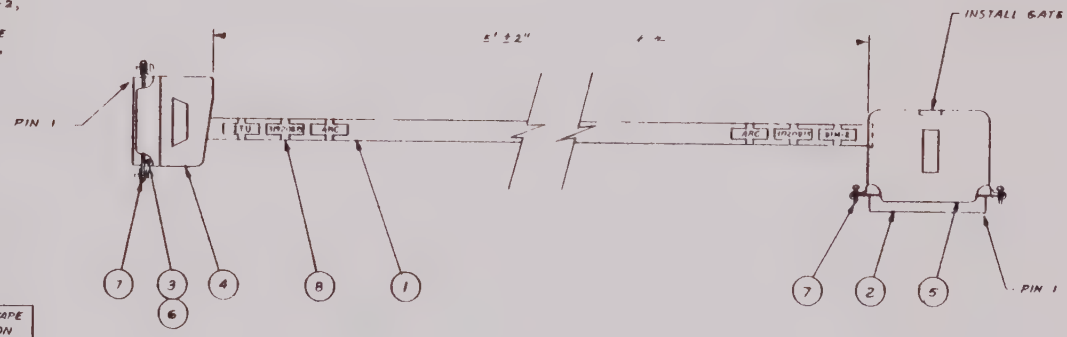
FORM NO. TP-139-3-77

Figure 4-2. (Continued).

REVISIONS				
SYM	DESCRIPTION	DATE	BY	CHK	APPD

NOTES:

1. ALL UNUSED WIRES ARE TO BE TERMINATED INSIDE HOOD IN SUCH A FASHION AS TO PREVENT SHORTING.
2. INSTALL UNUSED CRIMP TERMINALS IN 104 PIN PLUG HOUSING, ITEM 2.
3. CABLE MARKER, ITEM 8 TO BE AS FOLLOWS:
   ITEM 2, 104 PIN CONN., INSTALL THREE CABLE MARKERS WHICH READ "DTM-2, 31920875, & ARC".
   ITEM 3, DB25 CONN., INSTALL THREE CABLE MARKERS WHICH READ "ITU, 31920875, & ARC".



DTM-2 SIGNAL NAME	104 PIN CONN	WIRE COLOR	25 PIN CONN	INTERTAPE FUNCTION
GND	63	BLK	1	GND
GND	84	RED/YEL	14	$\overline{\text{ENABLE}}$
FO-6	67	RED	2	PAUSE
FO-4	69	RED/BLK	15	STOP/RESET
FO-5	68	WHT	3	MARKER(IN)
FO-7	66	WHT/BLK	16	RECORD
FO-2	71	GRN	4	REPLAY
FO-1	72	WHT/RED	17	REWIND
FI-4	61	ORG	5	$\overline{\text{MOTION}}$
FI-5	62	WHT/GRN	18	$\overline{\text{MARKER(OUT)}}$
FI-6	64	BLU	6	$\overline{\text{BUSY}}$
FI-7	65	WHT/YEL	19	SAFE
GND	104	WHT/BLU	20	GND

QTY REQD	PART OR IDENTIFYING NO.	ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER
6	PLMIM-M	8	CABLE MARKER		PANDUIT
2	35471	7	SCREW RETAINER, KIT OF 2		
13	35481	6	PIN, CONTACT, CRIMP		
1	35441	5	HOOD, STRAIN RELIEF		
1	35470	4	HOOD, STRAIN RELIEF		
1	35480	3	CONN. PLUG, 25 PIN		
1	35442	2	CONN. PLUG, 104 PIN, W/104 PINS		
5½'	34901	1	CABLE, 25 COND., #22 AWG (7X30)		

LIST OF MATERIALS OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ± —
FRACTIONS ± —
2 PLACE DECIMALS ± —
3 PLACE DECIMALS ± —
SURFACE ROUGHNESS √
DO NOT SCALE DRAWING
MATERIAL: —

APPROVAL	BY	DATE
DRAWN		8/26/77
CHECKED		9/8/77
ENGRG		9/8/77
PROJ ENGRG		9/9/77

APPROVED FOR ATLANTIC RESEARCH
NAME DATE 19
APPROVED
NAME DATE 19

ATLANTIC RESEARCH CORPORATION
ALEXANDRIA, VIRGINIA 22314

CABLE ASSEMBLY INTERTAPE TO INTERSHAKE II

ITU-X-2

CODE IDENT NO	SIZE	DRAWING NO	REV
95335	C	TP-SA-31920875	—

SCALE: — SHEET 1 OF 1

DASH NO.	NEXT ASSEMBLY	PROJECT
-	INTERTAPE	ITU
APPLICATION		

APPENDIX A

INTERTAPE ACCESSORIES AND SUPPLIES

ACCESSORIES AND SUPPLIES

MODEL 35650 – TAPE CARTRIDGE

The Atlantic Research 35650 Data Cartridge is a high performance bi-directional magnetic tape storage medium designed specifically for use in digital applications. With its 300 feet (91.4m) of 1/4" (6.3 mm) tape and its capability of recording at 1600 BPI (63 bpmm) on up to 4 data tracks, the Atlantic Research 35650 provides a total storage capacity of 23 million bits.

LABEL:	Extra adhesive backed cartridge labels are available; Part No. 34129.
TAPE:	Computer grade magnetic tape. Length: 300' (91.44 m) of useable storage.
RECORDING DENSITY:	3200 flux reversals per inch (126 frpmm) maximum.
TAPE POSITION SENSING:	Holes are provided in the tape for optical sensing of BOT, Loan Point, Early Warning, and EOT.
FILE PROTECT:	Screwdriver or coin activated window provided over file protect hole at front edge of cartridge. The window is open for FILE PROTECT.
SIZE:	4" x 6" x 0.665" (101.6 x 152.4 x 17 mm)
WEIGHT:	8 ounces (266.8g)

MODEL CAE – EIA INTERFACE CABLE

The 25 conductor EIA interface cable assembly can be furnished in any length, with a choice of either male or female EIA RS-232 connectors on either end to accommodate all EIA interface cabling requirements.

APPENDIX B

CODE CHARTS

UNIVERSAL CODE CHART FOR DATA COMMUNICATIONS

8-BIT ASCII		7-BIT ASCII		EVEN PARITY ASCII		ODD PARITY ASCII		EBCDIC		6-BIT TRANSCODE		6-BIT TYPESETTER		EBCD		SELECTRIC		FIELD DATA		BAUDOT	
	BINARY HEX		BINARY HEX		BINARY HEX		BINARY HEX		BINARY HEX		BINARY HEX		BINARY HEX		BINARY HEX		BINARY HEX		BINARY HEX		BINARY HEX
A	11 000 001 C1	A	1 000 001 41	A	01 000 001 41	A	11 000 001 C1	A	11 000 001 C1	A	000 001 01	A	000 011 03	A	0 100 011 23	A	1 111 001 79	A	000 110 06	A	– 00 011 03
B	11 000 010 C2	B	1 000 010 42	B	01 000 010 42	B	11 000 010 C2	B	11 000 010 C2	B	000 010 02	B	011 001 19	B	0 010 011 13	B	1 110 110 76	B	000 111 07	B	? 11 001 19
C	11 000 011 C3	C	1 000 011 43	C	11 000 011 C3	C	01 000 011 43	C	11 000 011 C3	C	000 011 03	C	001 110 0E	C	1 110 011 73	C	1 111 010 7A	C	000 000 08	C	: 01 110 0E
D	11 000 100 C4	D	1 000 100 44	D	01 000 100 44	D	11 000 100 C4	D	11 000 100 C4	D	000 100 04	D	001 001 09	D	0 001 011 0B	D	0 101 010 2A	D	000 001 09	D	$ 01 001 09
E	11 000 101 C5	E	1 000 101 45	E	11 000 101 C5	E	01 000 101 45	E	11 000 101 C5	E	000 101 05	E	000 001 01	E	1 101 011 6B	E	1 001 010 4A	E	000 010 0A	E	3 00 001 01
F	11 000 110 C6	F	1 000 110 46	F	11 000 110 C6	F	01 000 110 46	F	11 000 110 C6	F	000 110 06	F	001 101 0D	F	1 011 011 5B	F	1 110 011 73	F	000 011 0B	F	! 01 101 0D
G	11 000 111 C7	G	1 000 111 47	G	01 000 111 47	G	11 000 111 C7	G	11 000 111 C7	G	000 111 07	G	011 010 1A	G	0 111 011 3B	G	0 100 011 23	G	001 100 0C	G	& 11 010 1A
H	11 001 000 C8	H	1 001 000 48	H	01 001 000 48	H	11 001 000 C8	H	11 001 000 C8	H	001 000 08	H	010 100 14	H	0 000 111 07	H	0 100 110 26	H	001 101 0D	H	* 10 100 14
I	11 001 001 C9	I	1 001 001 49	I	11 001 001 C9	I	01 001 001 49	I	11 001 001 C9	I	001 001 09	I	000 110 06	I	1 100 111 67	I	0 011 001 19	I	001 110 0E	I	8 00 110 06
J	11 001 010 CA	J	1 001 010 4A	J	11 001 010 CA	J	01 001 010 4A	J	11 010 001 D1	J	010 001 11	J	001 011 0B	J	1 100 001 61	J	1 000 011 43	J	001 111 0F	J	01 011 0B
K	11 001 011 CB	K	1 001 011 4B	K	01 001 011 4B	K	11 001 011 CB	K	11 010 010 D2	K	010 010 12	K	001 111 0F	K	1 010 001 51	K	0 011 010 1A	K	010 000 10	K	. 01 111 0F
L	11 001 100 CC	L	1 001 100 4C	L	11 001 100 CC	L	01 001 100 4C	L	11 010 011 D3	L	010 011 13	L	010 010 12	L	0 110 001 31	L	1 000 110 46	L	010 001 11	L	) 10 010 12
M	11 001 101 CD	M	1 001 101 4D	M	01 001 101 4D	M	11 001 101 CD	M	11 010 100 D4	M	010 100 14	M	011 100 1C	M	1 001 001 49	M	1 100 001 61	M	010 010 12	M	, 11 100 1C
N	11 001 110 CE	N	1 001 110 4E	N	01 001 110 4E	N	11 001 110 CE	N	11 010 101 D5	N	010 101 15	N	001 100 0C	N	0 101 001 29	N	1 010 010 52	N	010 011 13	N	. 01 100 0C
O	11 001 111 CF	O	1 001 111 4F	O	01 001 111 CF	O	01 001 111 4F	O	11 010 110 D6	O	010 110 16	O	011 000 18	O	0 011 001 19	O	1 000 101 45	O	010 100 14	O	9 11 000 18
P	11 010 000 D0	P	1 010 000 50	P	01 010 000 50	P	11 010 000 D0	P	11 010 111 D7	P	010 111 17	P	010 110 16	P	1 111 001 79	P	0 001 011 0B	P	010 101 15	P	0 10 110 16
Q	11 010 001 D1	Q	1 010 001 51	Q	11 010 001 D1	Q	01 010 001 51	Q	11 011 000 D8	Q	011 000 18	Q	010 111 17	Q	1 000 101 45	Q	1 011 011 5B	Q	010 110 16	Q	1 10 111 17
R	11 010 010 D2	R	1 010 010 52	R	11 010 010 D2	R	01 010 010 52	R	11 011 001 D9	R	011 001 19	R	001 010 0A	R	0 100 101 25	R	0 101 001 29	R	010 111 17	R	4 01 010 0A
S	11 010 011 D3	S	1 010 011 53	S	11 010 011 53	S	01 010 011 D3	S	11 100 010 E2	S	100 010 22	S	000 101 05	S	1 010 010 52	S	0 100 101 25	S	011 000 18	S	Bell 00 101 05
T	11 010 100 D4	T	1 010 100 54	T	11 010 100 D4	T	01 010 100 54	T	11 100 011 E3	T	100 011 23	T	000 100 10	T	0 110 010 32	T	0 000 010 02	T	011 001 19	T	5 10 000 10
U	11 010 101 D5	U	1 010 101 55	U	11 010 101 D5	U	01 010 101 55	U	11 100 100 E4	U	100 100 24	U	000 111 07	U	1 001 010 4A	U	0 110 010 32	U	011 010 1A	U	7 00 111 07
V	11 010 110 D6	V	1 010 110 56	V	11 010 110 D6	V	01 010 110 56	V	11 100 101 E5	V	100 101 25	V	011 110 1E	V	0 101 010 2A	V	0 110 001 31	V	011 011 1B	V	. 11 110 1E
W	11 010 111 D7	W	1 010 111 57	W	11 010 111 D7	W	01 010 111 57	W	11 100 110 E6	W	100 110 26	W	010 011 13	W	0 011 010 1A	W	1 110 101 75	W	011 100 1C	W	2 10 011 13
X	11 011 000 D8	X	1 011 000 58	X	11 011 000 D8	X	01 011 000 58	X	11 100 111 E7	X	100 111 27	X	011 101 1D	X	1 111 010 7A	X	1 100 010 62	X	011 101 1D	X	; 11 101 1D
Y	11 011 001 D9	Y	1 011 001 59	Y	11 011 001 59	Y	01 011 001 D9	Y	11 101 000 E8	Y	101 000 28	Y	010 101 15	Y	0 100 111 47	Y	1 100 111 67	Y	011 110 1E	Y	6 10 101 15
Z	11 011 010 DA	Z	1 011 010 5A	Z	01 011 010 5A	Z	11 011 010 DA	Z	11 101 001 E9	Z	101 001 29	Z	010 001 11	Z	0 100 110 46	Z	1 010 100 54	Z	011 111 1F	Z	" 10 001 11
a	11 100 001 E1	a	1 100 001 61	a	11 100 001 E1	a	01 100 001 61	a	10 000 001 81												
b	11 100 010 E2	b	1 100 010 62	b	11 100 010 E2	b	01 100 010 62	b	10 000 010 82												
c	11 100 011 E3	c	1 100 011 63	c	01 100 011 63	c	11 100 011 E3	c	10 000 011 83												
d	11 100 100 E4	d	1 100 100 64	d	11 100 100 E4	d	01 100 100 64	d	10 000 100 84												
e	11 100 101 E5	e	1 100 101 65	e	01 100 101 65	e	11 100 101 E5	e	10 000 101 85												
f	11 100 110 E6	f	1 100 110 66	f	01 100 110 66	f	11 100 110 E6	f	10 000 110 86												
g	11 100 111 E7	g	1 100 111 67	g	11 100 111 E7	g	01 100 111 67	g	10 000 111 87												
h	11 101 000 E8	h	1 101 000 68	h	11 101 000 68	h	01 101 000 68	h	10 001 000 88												
i	11 101 001 E9	i	1 101 001 69	i	01 101 001 69	i	11 101 001 E9	i	10 001 001 89												
j	11 101 010 EA	j	1 101 010 6A	j	01 101 010 6A	j	11 101 010 EA	j	10 010 001 91												
k	11 101 011 EB	k	1 101 011 6B	k	01 101 011 6B	k	11 101 011 EB	k	10 010 010 92												
l	11 101 100 EC	l	1 101 100 6C	l	01 101 100 6C	l	11 101 100 EC	l	10 010 011 93												
m	11 101 101 ED	m	1 101 101 6D	m	01 101 101 6D	m	11 101 101 ED	m	10 010 100 94												
n	11 101 110 EE	n	1 101 110 6E	n	01 101 110 6E	n	11 101 110 EE	n	10 010 101 95												
o	11 101 111 EF	o	1 101 111 6F	o	01 101 111 6F	o	11 101 111 EF	o	10 010 110 96												
p	11 110 000 F0	p	1 110 000 70	p	11 110 000 F0	p	01 110 000 70	p	10 010 111 97												
q	11 110 001 F1	q	1 110 001 71	q	01 110 001 71	q	11 110 001 F1	q	10 011 000 98												
r	11 110 010 F2	r	1 110 010 72	r	01 110 010 72	r	11 110 010 F2	r	10 011 001 99												
s	11 110 011 F3	s	1 110 011 73	s	11 110 011 F3	s	01 110 011 73	s	10 100 010 A2												
t	11 110 100 F4	t	1 110 100 74	t	01 110 100 74	t	11 110 100 F4	t	10 100 011 A3												
u	11 110 101 F5	u	1 110 101 75	u	11 110 101 F5	u	01 110 101 75	u	10 100 100 A4												
v	11 110 110 F6	v	1 110 110 76	v	11 110 110 F6	v	01 110 110 76	v	10 100 101 A5												
w	11 110 111 F7	w	1 110 111 77	w	01 110 111 77	w	11 110 111 F7	w	10 100 110 A6												
x	11 111 000 F8	x	1 111 000 78	x	01 111 000 78	x	11 111 000 F8	x	10 100 111 A7												
y	11 111 001 F9	y	1 111 001 79	y	11 111 001 F9	y	01 111 001 79	y	10 101 000 A8												
z	11 111 010 FA	z	1 111 010 7A	z	11 111 010 FA	z	01 111 010 7A	z	10 101 001 A9												
0	10 110 000 B0	0	0 110 000 30	0	00 110 000 30	0	10 110 000 B0	0	11 110 000 F0	0	110 000 30	0	110 110 U 36	0	01 010 100 L 54	0	01 100 100 L 64	0	110 000 30	0	10 110 F 16
1	10 110 001 B1	1	0 110 001 31	1	10 110 001 B1	1	00 110 001 31	1	11 110 001 F1	1	110 001 31	1	111 101 U 3D	1	00 100 000 L 20	1	00 100 000 L 20	1	110 001 31	1	11 10 111 F 17
2	10 110 010 B2	2	0 110 010 32	2	10 110 010 B2	2	00 110 010 32	2	11 110 010 F2	2	110 010 32	2	110 011 U 33	2	00 010 000 L 10	2	00 010 000 L 10	2	110 010 32	2	12 10 011 F 13
3	10 110 011 B3	3	0 110 011 33	3	00 110 011 33	3	10 110 011 B3	3	11 110 011 F3	3	110 011 33	3	130 001 U 21	3	00 110 000 L 30	3	01 110 000 L 70	3	110 011 33	3	13 00 001 F 01
4	10 110 100 B4	4	0 110 100 34	4	00 110 100 34	4	10 110 100 B4	4	11 110 100 F4	4	110 100 34	4	101 010 U 2A	4	00 001 000 L 08	4	00 000 100 L 04	4	110 100 34	4	01 010 F 0A
5	10 110 101 B5	5	0 110 101 35	5	00 110 101 35	5	10 110 101 B5	5	11 110 101 F5	5	110 101 35	5	110 000 U 30	5	01 101 000 L 68	5	00 001 000 L 08	5	110 101 35	5	10 000 F 10
6	10 110 110 B6	6	0 110 110 36	6	00 110 110 36	6	10 110 110 B6	6	11 110 110 F6	6	110 110 36	6	101 001 U 25	6	01 011 000 L 58	6	00 011 000 L 58	6	110 110 36	6	15 10 101 F 15
7	10 110 111 B7	7	0 110 111 37	7	10 110 111 B7	7	00 110 111 37	7	11 110 111 F7	7	110 111 37	7	100 111 U 27	7	00 111 000 L 38	7	01 101 000 L 68	7	110 111 37	7	00 111 F 07
8	10 111 000 B8	8	0 111 000 38	8	10 111 000 B8	8	00 111 000 38	8	11 111 000 F8	8	111 000 38	8	100 110 U 26	8	00 000 100 L 04	8	00 111 000 L 38	8	111 000 38	8	11 010 F 1A
9	10 111 001 B9	9	0 111 001 39	9	00 111 001 39	9	10 111 001 B9	9	11 111 001 F9	9	111 001 39	9	111 000 U 38	9	01 100 100 L 64	9	00 110 100 L 34	9	111 001 39	9	11 000 F 18
SP	10 100 000 A0	SP	0 100 000 20	SP	10 100 000 A0	SP	00 100 000 20	SP	01 000 000 40	SP	011 010 1A	SP	000 100 S/U 04	SP	01 000 000 – 40	SP	01 000 000 – 40	SP	000 101 05	SP	00 100 – 04
!	10 100 001 A1	!	0 100 001 21	!	00 100 001 21	!	10 100 001 A1	!	01 011 010 5A				100 011 S 23	!	01 110 101 U 75	!	00 000 001 L 01	!	101 101 2D	!	01 101 F 0D
"	10 100 010 A2	"	0 100 010 22	"	00 100 010 22	"	10 100 010 A2	"	01 111 111 7F					"	00 110 100 U 34	"	01 001 001 U 49			"	10 001 F 11
#	10 100 011 A3	#	0 100 011 23	#	10 100 011 A3	#	00 100 011 23	#	01 111 011 7B	#	111 011 3B			#	00 110 100 L 34	#	01 110 000 U 70	#	100 110 28	#	10 100 F 14
$	10 100 100 A4	$	0 100 100 24	$	00 100 100 24	$	10 100 100 A4	$	01 011 011 5B	$	011 011 1B	$	100 011 U 23	$	01 110 101 L 75	$	00 000 100 U 04	$	100 111 27	$	01 001 F 09
%	10 100 101 A5	%	0 100 101 25	%	00 100 101 25	%	10 100 101 A5	%	01 101 100 6C	%	101 100 2C			%	01 101 000 U 68	%	00 001 000 U 08	%	101 010 2A		
&	10 100 110 A6	&	0 100 110 26	&	10 100 110 A6	&	00 100 110 26	&	01 010 000 50	&	010 000 10	&	111 000 S 38	&	01 000 011 L 43	&	01 101 000 U 68	&	000 001 01		
'	10 100 111 A7	'	0 100 111 27	'	00 100 111 27	'	10 100 111 A7	'	01 111 101 7D					'	01 001 001 L 49	'	01 001 001 U 58	'	111 010 2A	'	01 011 F 0B
(	10 101 000 A8	(	0 101 000 28	(	00 101 000 28	(	10 101 000 A8	(	01 001 101 4D			(	110 001 S 31	(	01 100 100 U 54	(	00 110 100 U 34	(	101 001 29	(	01 111 F 0F
)	10 101 001 A9	)	0 101 001 29	)	10 101 001 A9	)	00 101 001 29	)	01 011 101 5D			)	110 001 U 31	)	00 100 100 U 54	)	01 100 100 U 64	)	100 000 20	)	10 010 F 12
*	10 101 010 AA	*	0 101 010 2A	*	10 101 010 AA	*	00 101 010 2A	*	01 011 100 5C	*	011 100 1C			*	00 000 100 U 04	*	00 111 000 U 38	*	101 000 28		
+	10 101 011 AB	+	0 101 011 2B	+	00 101 011 2B	+	10 101 011 AB	+	01 001 110 4E					+	01 000 011 U 43	+	00 010 011 U 13	+	100 010 22		
,	10 101 100 AC	,	0 101 100 2C	,	10 101 100 AC	,	00 101 100 2C	,	01 101 011 6B	,	101 011 2B			,	01 110 110 L 76	,	00 111 011 * 3E	,	101 110 2E	,	01 100 F 0C
-	10 101 101 AD	-	0 101 101 2D	-	00 101 101 2D	-	10 101 101 AD	-	01 100 000 50	-	100 000 20	-	101 001 U 29	–	00 000 001 * 01	–	00 110 111 L 37	–	100 001 21	–	00 011 F 03
.	10 101 110 AE	.	0 101 110 2E	.	00 101 110 2E	.	10 101 110 AE	.	01 001 011 4B	.	001 011 0B	.	111 100 S/U 3C	.	00 100 111 L 27	.	01 010 001 * 51	.	111 101 3D		11 100 F 1C
/	10 101 111 AF	/	0 101 111 2F	/	10 101 111 AF	/	00 101 111 2F	/	01 100 001 61	/	100 001 21			/	01 100 010 L 62	/	00 000 111 L 07	/	111 100 3C		11 101 F 1D

COURTESY OF

ATLANTIC RESEARCH CORPORATION

5390 CHEROKEE AVENUE · ALEXANDRIA, VIRGINIA 22314

703-354-3400

MANUFACTURERS OF INTERSHAKE and DATA TEK 9600

[NO LOWER CASE]

CAPS = "SHIFT"
LC = "UNSHIFT"
UNSHIFT 011 111 1F
SHIFT 011 011 1B

CAPS = "UC"
LC = "LC"
LC 00 011 111 1F
UC 00 011 100 1C

UPPER CASE (U)
LOWER CASE (L)
EITHER (*)

CAPS = "UC"
LC = "LC"
LC 00 011 111 1F
UC 00 011 100 1C

UPPER CASE (U)
LOWER CASE (L)
EITHER (*)

[NO LOWER CASE]

[NO LOWER CASE]
"LETTERS" 11 111 1F
"FIGURES" 11 011 1B

NIVERSAL CODE CHART FOR DATA COMMUNICATIONS

8-BIT ASCII		7-BIT ASCII		EVEN PARITY ASCII		ODD PARITY ASCII		EBCDIC		6-BIT TRANSCODE		6-BIT TYPESETTER		EBCD		SELECTRIC		FIELD DATA		BAUDOT	
BINARY	HEX	BINARY	HEX	BINARY	HEX	BINARY	HEX	BINARY	HEX	BINARY	HEX	BINARY	HEX	BINARY C 1 2 4 8 A B	HEX	BINARY C 1 2 4 8 A B	HEX	BINARY	HEX	BINARY	HEX
10 111 010	BA	: 0 111 010	3A	: 00 111 010	3A	: 10 111 010	8A	: 01 111 010	7A			: 111 010 $	3A	: 00 001 000 U	08	: 01 101 011 U	6B	. 101 011	2B	: 01 110 F	0E
10 111 011	BB	; 0 111 011	3B	; 00 111 011	3B	; 10 111 011	BB	; 01 011 110	5E			; 111 010 U	3A	; 00 110 000 U	30	; 01 101 011 L	6B	, 111 011	3B	; 11 110 F	1E
10 111 100	BC	< 0 111 100	3C	< 00 111 100	3C	< 10 111 100	BC	< 01 001 100	4C	< 001 100	0C			< 00 010 000 U	10			< 100 011	23		
10 111 101	BD	= 0 111 101	3D	= 00 111 101	3D	= 10 111 101	BD	= 01 111 110	7E					= 00 100 000 U	20	= 00 010 011 L	13	= 100 100	24		
10 111 110	BE	> 0 111 110	3E	> 00 111 110	3E	> 10 111 110	BE	> 01 101 110	6E					> 00 111 000 U	38			> 100 101	25		
10 111 111	BF	? 0 111 111	3F	? 00 111 111	3F	? 10 111 111	BF	? 01 101 111	6F	? 110 110 $	36	? 101 001 $	29	? 01 100 010 U	62	? 00 000 111 U	07	? 101 100	2C	? 11 001 F	19
11 000 000	C0	@ 1 000 000	40	@ 11 000 000	C0	@ 01 000 000	40	@ 01 111 100	7C	@ 111 100	3C	@ 101 001 $	29	@ 00 000 010 L	02	@ 00 010 000 U	10	@ 101 111	2F		
11 011 011	DB	[1 011 011	5B	[11 011 011	DB	[01 011 011	5B									[00 100 000 U	20	[000 011	03		
11 011 100	DC	\ 1 011 100	5C	\ 01 011 100	5C	\ 11 011 100	DC	\ 11 100 000	E0												
11 011 101	DD	] 1 011 101	5D	] 11 011 101	DD	] 01 011 101	5D									] 00 100 000 L	20	] 000 100	04		
11 011 110	DE	^ 1 011 110	5E	^ 11 011 110	DE	^ 01 011 110	5E											^ 000 010	02		
11 011 111	DF	_ 1 011 111	5F	_ 01 011 111	5F	_ 11 011 111	DF	_ 01 101 101	6D							_ 00 110 111 U	37				
		` 1 100 000	60	` 01 100 000	60	` 11 100 000	E0	` 01 101 001	79												
11 111 011	FB	{ 1 111 011	7B	{ 01 111 011	7B	{ 11 111 011	FB	{ 11 000 000	C0					UPPER CASE (U) LOWER CASE (L) EITHER (*)		UPPER CASE (U) LOWER CASE (L) EITHER (*)					
11 111 100	FC	| 1 111 100	7C	| 11 111 100	FC	| 01 111 100	7C	| 01 101 010	6A												
11 111 101	FD	} 1 111 101	7D	} 01 111 101	7D	} 11 111 101	FD	} 11 010 000	D0												
11 111 110	FE	~ 1 111 110	7E	~ 01 111 101	7E	~ 11 111 110	FE	~ 10 100 001	A1												
								¢ 01 001 010	4A					¢ 00 000 010 U	02	¢ 01 011 000 U	58				
								¬ 01 011 111	5F					¬ 00 110 111 U	37						
								¦ 01 001 111	4F			↓V 101 000 S/U 28		¦ 01 110 110 U	76						
														± 00 100 000 U	20						
														÷ 00 000 001 U	01						
								UNSHIFT 011 111	1F					UC 00 011 100	1C	UC 00 011 100	1C			FIGS 11 011	1B
ACK	10 000 110	86	ACK 0 000 110	06	ACK 00 000 110	06	ACK 10 000 110	86	SHIFT 011 011	1B	ACK	00 101 110	2E	LC 00 011 111	1F	LC 00 011 111	1F			LTRS 11 111	1F
BEL	10 000 111	87	BEL 0 000 111	07	BEL 10 000 111	87	BEL 00 000 111	07	BEL	00 101 111	2F	BEL 001 101	0D	BEL 101 011	2B						
BS	10 001 000	88	BS 0 001 000	08	BS 10 001 000	88	BS 00 001 000	08	BS	00 010 110	16					BS 01 011 101	5D	BS 01 011 101	5D		
								BYP	00 100 100	24					BYP 00 001 110	0E	BY 00 001 110	0E		
CAN	10 011 000	98	CAN 0 011 000	18	CAN 00 011 000	18	CAN 10 011 000	98	CAN	00 011 000	18										
								CC	00 011 010	1A											
CR	10 001 101	8D	CR 0 001 101	0D	CR 10 001 101	8D	CR 00 001 101	0D	CR	00 001 101	0D										
DC1	10 010 001	91	DC1 0 010 001	11	DC1 00 010 001	11	DC1 10 001 001	81	DC1	00 010 001	11	RET 001 000	08					CR 111 111	3F	CR 01 000	08
DC2	10 010 010	92	DC2 0 010 010	12	DC2 00 010 010	12	DC2 10 010 010	92	DC2	00 010 010	12										
DC3	10 010 011	93	DC3 0 010 011	13	DC3 10 010 011	93	DC3 00 010 011	13	DC3	00 010 011	13										
DC4	10 010 100	94	DC4 0 010 100	14	DC4 00 010 100	14	DC4 10 010 100	94	DC4	00 011 100	3C										
DEL	11 111 111	FF	DEL 1 111 111	7F	DEL 11 111 111	FF	DEL 01 111 111	7F	DEL	00 000 111	07	DEL 111 111	3F	RUBOUT 111 111	3F	DEL 01 111 111	7F	DEL 01 111 111	7F		
DLE	10 010 000	90	DLE 0 010 000	10	DLE 10 010 000	90	DLE 00 010 000	10	DLE	00 010 000	10	DLE 011 111	1F								
								DS	00 100 000	20				ELEVATE 000 010	02						
EM	10 011 001	99	EM 0 011 001	19	EM 10 011 001	99	EM 00 011 001	19	EM	00 011 001	19	EM 111 110	3E	THIN SP 100 000	20						
ENQ	10 000 101	85	ENQ 0 000 101	05	ENQ 00 000 101	05	ENQ 10 000 101	85	ENQ	00 101 101	2D	ENQ 101 101	2D	ADD TH SP 100 100	24						
								EOB	00 100 110	26				EM SP 100 101	25	EOB 01 011 110	5E	EOB 01 011 110	5E		
EOT	10 000 100	84	EOT 0 000 100	04	EOT 10 000 100	84	EOT 00 000 100	04	EOT	00 110 111	37	EOT 011 110	1E	EN SP 101 110	2E	EOT 01 111 100	7C	EOT 01 111 100	7C		
ESC	10 011 011	9B	ESC 0 011 011	1B	ESC 10 011 011	9B	ESC 00 011 011	1B	ESC	00 100 111	27	ESC 101 010	2A	QR 101 111	2F						
ETB	10 010 111	97	ETB 0 010 111	17	ETB 00 010 111	17	ETB 10 010 111	97	ETB	00 100 110	26	ETB 001 111	0F	V RULE 110 010	32						
ETX	10 000 011	83	ETX 0 000 011	03	ETX 00 000 011	03	ETX 10 000 011	83	ETX	00 000 011	03	ETX 101 110	2E	EM LEAD 110 100	34						
FF	10 001 100	8C	FF 0 001 100	0C	FF 00 001 100	0C	FF 10 001 100	8C	FF	00 001 100	0C			EN LEAD 110 111	37						
FS	10 011 100	9C	FS 0 011 100	1C	FS 10 011 100	9C	FS 00 011 100	1C	FS	00 100 010	22			U RAIL 111 001	39			FF 111 110	3E		
GS	10 011 101	9D	GS 0 011 101	1D	GS 00 011 101	1D	GS 10 011 101	9D						L RAIL 111 011	3B						
HT	10 001 001	89	HT 0 001 001	09	HT 00 001 001	09	HT 10 001 001	89	HT	00 000 101	05	HT 101 111	2F	Q CENT 111 110	3E	HT 00 101 111	2F	HT 00 101 111	2F		
								IFS	00 011 100	1C											
								IGS	00 011 101	1D											
								IL	00 010 111	17						IL 00 111 101	3D	IL 00 111 101	3D		
								IRS	00 011 110	1E											
								IUS	00 011 111	1F											
								LC	00 000 110	06						LC 00 011 111	1F	LC 00 011 111	1F		
LF	10 001 010	8A	LF 0 001 010	0A	LF 00 001 010	0A	LF 10 001 010	8A	LF	00 100 101	25					LF 01 101 110	6E	LF 01 101 110	6E	LF	00 010 02
NAK	10 010 101	95	NAK 0 010 101	15	NAK 10 010 101	95	NAK 00 010 101	15	NAK	00 111 101	3D	NAK 111 101	3D								
								NL	00 010 101	15						NL 01 101 101	6D	NL 01 101 101	6D		
NUL	10 000 000	80	NUL 0 000 000	00	NUL 00 000 000	00	NUL 10 000 000	80	NUL	00 000 000	00										
								PF	00 000 100	04				PF 100 010	22	PF 01 001 111	4F	PF 01 001 111	4F		
								PN	00 110 100	34						PN 01 001 100	4C	PN 01 001 100	4C		
								PRE	00 100 111	27						PRE 00 111 110	3E	PRE 00 111 110	3E		
								RES	00 010 100	14						RES 00 001 101	0D	RES 00 001 101	0D		
								RLF	00 001 001	09											
RS	10 011 110	9E	RS 0 011 110	1E	RS 00 011 110	1E	RS 10 011 110	9E	RS	00 110 101	35					RS 00 101 100	2C	RS 00 101 100	2C		
SI	10 001 111	8F	SI 0 001 111	0F	SI 00 001 111	0F	SI 10 001 111	8F	SI	00 001 111	0F										
								SM	00 101 010	2A											
								SMM	00 001 010	0A											
SO	10 001 110	8E	SO 0 001 110	0E	SO 10 001 110	8E	SO 00 001 110	0E	SO	00 001 110	0E										
SOH	10 000 001	81	SOH 0 000 001	01	SOH 10 000 001	81	SOH 00 000 001	01	SOH	00 000 001	01	SOH 000 000	00								
								SOS	00 100 001	21											
STX	10 000 010	82	STX 0 000 010	02	STX 10 000 010	82	STX 00 000 010	02	STX	00 000 010	02	STX 001 010	0A								
SUB	10 011 010	9A	SUB 0 011 010	1A	SUB 10 011 010	9A	SUB 00 011 010	1A	SUB	00 111 111	3F	SUB 001 110	0E								
SYN	10 010 110	96	SYN 0 010 110	16	SYN 10 010 110	96	SYN 00 010 110	16	SYN	00 110 010	32	SYN 111 010	3A								
								UC	00 110 110	36						UC 00 011 100	1C	UC 00 011 100	1C		
US	10 011 111	9F	US 0 011 111	1F	US 10 011 111	9F	US 00 111 111	1F				US 011 101	1D								
VT	10 001 011	8B	VT 0 001 011	0B	VT 10 001 011	9B	VT 00 001 011	0B	VT	00 001 011	0B										

TP 104-8-75

DECIMAL	HEX	OCTAL	ASCII	EBCDIC	EBCD UC	EBCD LC	SELECTRIC UC	SELECTRIC LC	APL
64	40	100	@	SP	SP		SP		∘
65	41	101	A						?
66	42	102	B						/
67	43	103	C		+	&	J	j	⌈
68	44	104	D						~
69	45	105	E		Q	q	O	o	↓
70	46	106	F		Y	y	L	l	∪
71	47	107	G						⍵
72	48	110	H						⊃
73	49	111	I		M	m	"	'	↑
74	4A	112	J	¢			E	e	⊂
75	4B	113	K	.	U	u			←
76	4C	114	L	<	PN		PN		⊢
77	4D	115	M	(					→
78	4E	116	N	+					≥
79	4F	117	O	!	PF		PF		−
80	50	120	P	&					⍵
81	51	121	Q		K	k	.	.	A
82	52	122	R		S	s	N	n	B
83	53	123	S						C
84	54	124	T		)	0	Z	z	D
85	55	125	U						E
86	56	126	V						F
87	57	127	W						G
88	58	130	X		'	6	¢	6	H
89	59	131	Y						I
90	5A	132	Z	!					J
91	5B	133	[	$	F	f	Q	q	K
92	5C	134	\	*					L
93	5D	135	]	)	BS		BS		M
94	5E	136	^	;	EOB		EOB		N
95	5F	137	_	¬					O
96	60	140	`	-					P
97	61	141	a	/	J	j	M	m	Q
98	62	142	b		?	/	X	x	R
99	63	143	c						S
100	64	144	d		(	9	)	0	T
101	65	145	e						U
102	66	146	f						V
103	67	147	g		I	i	Y	y	W
104	68	150	h		%	5	&	7	X
105	69	151	i						Y
106	6A	152	j	:					Z
107	6B	153	k	,	E	e	:	:	⊣
108	6C	154	l	%					—
109	6D	155	m	-	NL		NL		⊣
110	6E	156	n	>	LF		LF		$
111	6F	157	o	?					DEL
112	70	160	p				#	3	
113	71	161	q						
114	72	162	r						
115	73	163	s	:	C	c	F	f	
116	74	164	t						
117	75	165	u		!	$	W	w	
118	76	166	v		,	,	B	b	
119	77	167	w						
120	78	170	x						
121	79	171	y	\	P	p	A	a	
122	7A	172	z	:	X	x	C	c	
123	7B	173	{	#					
124	7C	174	:	@	EOT		EOT		
125	7D	175	}	'					
126	7E	176	~	=					
127	7F	177	DEL	"	DEL		DEL		

DECIMAL	HEX	OCTAL	ASCII	EBCDIC
128	80	200	NUL	
129	81	201	SOH	a
130	82	202	STX	b
131	83	203	ETX	c
132	84	204	EOT	d
133	85	205	ENQ	e
134	86	206	ACK	f
135	87	207	BEL	g
136	88	210	BS	h
137	89	211	HT	i
138	8A	212	LF	
139	8B	213	VT	
140	8C	214	FF	
141	8D	215	CR	
142	8E	216	SO	
143	8F	217	SI	
144	90	220	DLE	
145	91	221	DC1	j
146	92	222	DC2	k
147	93	223	DC3	l
148	94	224	DC4	m
149	95	225	NAK	n
150	96	226	SYN	o
151	97	227	ETB	p
152	98	230	CAN	q
153	99	231	EM	r
154	9A	232	SUB	
155	9B	233	ESC	
156	9C	234	FS	
157	9D	235	GS	
158	9E	236	RS	
159	9F	237	US	
160	A0	240	SP	
161	A1	241	!	~
162	A2	242	"	s
163	A3	243	#	t
164	A4	244	$	u
165	A5	245	%	v
166	A6	246	&	w
167	A7	247	'	x
168	A8	250	(	y
169	A9	251	)	z
170	AA	252	*	
171	AB	253	+	
172	AC	254	,	
173	AD	255	-	
174	AE	256	.	
175	AF	257	/	
176	B0	260	0	
177	B1	261	1	
178	B2	262	2	
179	B3	263	3	
180	B4	264	4	
181	B5	265	5	
182	B6	266	6	
183	B7	267	7	
184	B8	270	8	
185	B9	271	9	
186	BA	272	:	
187	BB	273	;	
188	BC	274	<	
189	BD	275	=	
190	BE	276	>	
191	BF	277	?	

DECIMAL	HEX	OCTAL	ASCII	EBCDIC
192	C0	300	@	{
193	C1	301	A	A
194	C2	302	B	B
195	C3	303	C	C
196	C4	304	D	D
197	C5	305	E	E
198	C6	306	F	F
199	C7	307	G	G
200	C8	310	H	H
201	C9	311	I	I
202	CA	312	J	
203	CB	313	K	
204	CC	314	L	
205	CD	315	M	
206	CE	316	N	
207	CF	317	O	
208	D0	320	P	}
209	D1	321	Q	J
210	D2	322	R	K
211	D3	323	S	L
212	D4	324	T	M
213	D5	325	U	N
214	D6	326	V	O
215	D7	327	W	P
216	D8	330	X	Q
217	D9	331	Y	R
218	DA	332	Z	
219	DB	333	[	
220	DC	334	\	
221	DD	335	]	
222	DE	336	^	
223	DF	337	_	
224	E0	340	`	\
225	E1	341	a	
226	E2	342	b	S
227	E3	343	c	T
228	E4	344	d	U
229	E5	345	e	V
230	E6	346	f	W
231	E7	347	g	X
232	E8	350	h	Y
233	E9	351	i	Z
234	EA	352	j	
235	EB	353	k	
236	EC	354	l	
237	ED	355	m	
238	EE	356	n	
239	EF	357	o	
240	F0	360	p	0
241	F1	361	q	1
242	F2	362	r	2
243	F3	363	s	3
244	F4	364	t	4
245	F5	365	u	5
246	F6	366	v	6
247	F7	367	w	7
248	F8	370	x	8
249	F9	371	y	9
250	FA	372	z	
251	FB	373	{	
252	FC	374	:	
253	FD	375	}	
254	FE	376	~	
255	FF	377	DEL	

HEX, OCTAL, DECIMAL, CHARACTER CODE CHART

DECIMAL	HEX	OCTAL	ASCII	EBCDIC	EBCD UC	EBCD LC	SELECTRIC UC	SELECTRIC LC	APL	FIELD DATA	6 BIT TYPESETTER SHIFT	6 BIT TYPESETTER UNSHIFT	6-BIT TRANSCODE	BAUDOT LTRS	BAUDOT FIGS
0	00	000	NUL	NUL					NUL				SOH		
1	01	001	SOH	SOH			0	1	SOH	&	E	e	A	E	3
2	02	002	STX	STX	c	C	T	t	STX	∧	ELEVATE		B	LF	
3	03	003	ETX	ETX					ETX	[	A	a	C	A	
4	04	004	EOT	PF	*	8	$	4	EOT	]	SPACE		D	SP	
5	05	005	ENQ	HT					ENQ	SP	S	s	E	S	BEL
6	06	006	ACK	LC					ACK	A	I	i	F	I	8
7	07	007	BEL	DEL	H	h	?	1	BEL	B	U	u	G	U	7
8	08	010	BS		:	4	%	5	BS	C	RETURN		H	CR	
9	09	011	HT	RLF					HT	D	D	d	I	D	$
10	0A	012	LF	SMM					LF	E	R	r	STX	R	4
11	0B	013	VT	VT	D	d	P	p	VT	F	J	j	.	J	
12	0C	014	FF	FF					FF	G	N	n	<	N	,
13	0D	015	CR	CR	RES		RES		CR	H	F	f	BELL	F	'
14	0E	016	SO	SO	BYP		BY		SO	I	C	c	SUB	C	
15	0F	017	SI	SI					SI	J	K	k	ETB	K	(
16	10	020	DLE	DLE	<	2	@	2	DLE	K	T	t	&	T	5
17	11	021	DC1	DC1					DC1	L	Z	z	J	Z	"
18	12	022	DC2	DC2					DC2	M	L	l	K	L	)
19	13	023	DC3	DC3	B	b	+	=	DC3	N	W	w	L	W	2
20	14	024	DC4	RES					DC4	O	H	h	M	H	#
21	15	025	NAK	NL					NAK	P	Y	y	N	Y	6
22	16	026	SYN	BS					SYN	Q	P	p	O	P	0
23	17	027	ETB	IL					ETB	R	Q	q	P	Q	1
24	18	030	CAN	CAN					CAN	$	D	d	Q	O	9
25	19	031	EM	EM	O	o	I	i	EM	T	B	b	R	B	?
26	1A	032	SUB	CC	W	w	K	k	SUB	U	G	g	SPACE	G	≡
27	1B	033	ESC						ESC	V	SHIFT		$	FIGS	
28	1C	034	FS	IFS	UPPER CASE		UPPER CASE		FS	W	M	m	*	M	
29	1D	035	GS	IGS					GS	X	X	x	US	X	/
30	1E	036	RS	IRS					RS	Y	V	v	EOT	V	.
31	1F	037	US	IUS	LOWER CASE		LOWER CASE		US	Z	UNSHIFT		DLE	LTRS	
32	20	040	SP	DS	=	1	[±1]		SP	)	THIN SPACE		–		
33	21	041	!	SOS					‥	–	3		/		
34	22	042	"	FS					)	+	PF		S		
35	23	043	≠		A	a	G	g	<	<	'	$	T		
36	24	044	$	BYP					≥	=	ADD THIN SPACE		U		
37	25	045	%	LF	R	r	S	s	*	>	EM SPACE		V		
38	26	046	&	ECB/ETB	Z	z	H	h	>	#		8	W		
39	27	047	'	ESC/PRE					]	$		7	X		
40	28	050	(						∨	*	¥	¥	Y		
41	29	051	)		N	n	R	r	∧	(	●	–	Z		
42	2A	052	*	SM	V	v	D	d	≠	%		4	ESC		
43	2B	053	+						÷		BELL				
44	2C	054	,		RS		RS		,	?			%		
45	2D	055	–	ENQ					+	!	'	'	ENQ		
46	2E	056	.	ACK					.	.	EN SPACE		ETX		
47	2F	057	/	BEL	HT		HT		/	●	QR		HT		
48	30	060	0		;	3			0	0		5	0		
49	31	061	1		L	l	V	v	1	1	(	)	1		
50	32	062	2	SYN	T	t	U	u	2	2	RULE		2		
51	33	063	3						3	3	.	2	3		
52	34	064	4	PN	"	#	(	9	4	4	EM LEADER		4		
53	35	065	5	RS					5	5		6	5		
54	36	066	6	UC					6	6	?	0	6		
55	37	067	7	EOT	¬		–	.	7	7	EN LEADER		7		
56	38	070	8		>	7	*	8	8	8	&	9	8		
57	39	071	9						9	9	UPPER RAIL		9		
58	3A	072	:						(	'	:	;	SYN		
59	3B	073	;		G	g	,	,	[	:	LOWER RAIL		#		
60	3C	074	<	DC4					.	/	.	.	@		
61	3D	075	=	NAK	IL		IL		X	-		1	NAK		
62	3E	076	>		PRE		PRE		.	FF	QUAD CENTER		EM		
63	3F	077	?	SUB					\	CR	RUBOUT		DEL		

APPENDIX C

RS-232 PIN ASSIGNMENTS

Table C-1. RS-232 Cable Pin Assignments

PIN NUMBER	CIRCUIT	DESCRIPTION
1	AA	Protective Ground
2	BA	Transmitted Data
3	BB	Received Data
4*	CA	Request to Send
5*	CB	Clear to Send
6*	CC	Data Set Ready
7	AB	Signal Ground (Common Return)
8*	CF	Receive Line Signal Detector (C-DET)
9	—	(Reserved for Data Set Testing)
10	—	(Reserved for Data Set Testing)
11		Unassigned
12	SCF	Secondary Received Line Signal Detector
13	SCB	Secondary Clear to Send
14	SBA	Secondary Transmitted Data
15	DB	Transmission Signal Element Timing (DCE Source)
16	SBB	Secondary Received Data
17	DD	Receiver Signal Element Timing (DCE Source)
18		Unassigned
19	SCA	Secondary Request to Send
20*	CD	Data Terminal Ready
21	CG	Signal Quality Detector
22	CE	Ring Detector
23	CH/CI	Data Signal Rate Selector (DTE/DCE Source)
24	DA	Transmit Signal Element Timing (DTE Source)
25		Unassigned

*Signals recorded as part of status data.

APPENDIX D

INTERTAPE PHYSICAL CHARACTERISTICS

INTERTAPE PHYSICAL CHARACTERISTICS

AC POWER – 115/220 (+10%) volts (switchable), 47-63 Hertz, 75 watts

WEIGHT – 26 pounds, 11.8Kqs

SIZE – ITU-1: DESK MODEL
20" Wide X 5" High X 17½" Deep
(51 cm) (12.75 cm) (45 cm)

ITU-2*: PORTABLE AND RACK MOUNTING MODEL
17" Wide X 7" High X 19" Deep
(43 cm) (18 cm) (48 cm)

*Supplied with Mounting Ears for 19" Rack Mounting.

APPENDIX E

BAUD RATE
VS
RECORDING TIME

Table E-1. Baud Rate vs Recording Time

BAUD RATE	RECORD TIME WITH STATUS	RECORD TIME WITHOUT STATUS
50	34.1 Hrs.	51.2 Hrs.
75	22.8 Hrs.	34.2 Hrs.
110	15.5 Hrs.	23.3 Hrs.
134.5	12.7 Hrs.	19.0 Hrs.
150	11.4 Hrs.	17.1 Hrs.
300	5.7 Hrs.	8.6 Hrs.
600	2.9 Hrs.	4.4 Hrs.
1200	85.3 Min.	2.1 Hrs.
1800	56.9 Min.	85.4 Min.
2400	42.6 Min.	63.9 Min.
4800	21.3 Min.	32.0 Min.
9600	10.7 Min.	16.1 Min.

Recording time formula with status:

$$\text{Recording time} = \frac{102{,}350}{\text{Baud Rate}} \text{ minutes}$$

RECORD

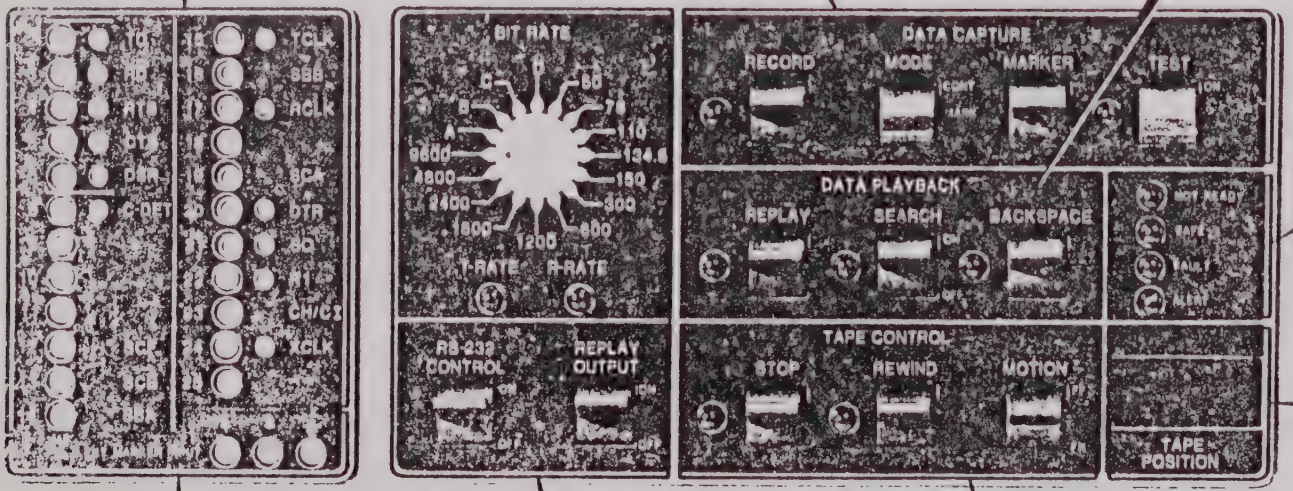
1. RECORD switch initiates RECORD at bit rate as selected and with or without RS-232 status as selected.
2. MODE – Selects method of terminating recording (other than depressing STOP).
   - A. MARKER – Stops recording at end of track 4 after Marker (Manual or External) occurs.
   - B. FULL – Stops recording at end of track 4, i.e., full cartridge.
   - C. CONT – Recording cartridge in continuous loop - terminated by depressing STOP.
3. MARKER – Switch depression is recorded to aid in replay - will initiate AUTO STOP at end of track 4 if MARK mode is selected.
4. A. Manual or External Marker occurs - Marker indicator is ON steady during event.
   B. Manual or External Marker occurs - Mark mode is selected - End of track 4 occurs AUTO STOP is initiated, Mark indicator flashes and STOP indicator is ON steady
   C. Depression of any switch will turn the Marker IND OFF when flashing

REPLAY

1. REPLAY switch initiates play back at bit rate as selected, with or without status as selected and with or without DATA OUT selected.
2. Replay Marker is detected and SEARCH Mode is selected. AUTO STOP is initiated - Replay Marker indicator flashes - Depression of any switch turns OFF flashing Marker IND.
3. REPLAY Marker is detected (SEARCH Mode not selected) Marker IND "ON" steady during Marker from tape.
4. BACK SPACE - Backs Tape up one record (Approx. 8 inch or 1/4 sec line time) per depression
5. REPLAY Output - ON/OFF. OFF inhibits Data Out and Maintains REPLAY mode

TEST JACKS AND DISPLAY FOR RS232 INTERFACE

1. Monitors the output side of the unit, i.e., during RECORD the line information being recorded is displayed; during REPLAY the playback data from tape is monitored.



NOT READY – Flashes if cartridge out or sensors out

SAFE – Flashes if cartridge SAFE switch is ON. If RECORD switch is depressed, unit goes to STOP mode.

FAULT – Tape in Fault condition; EOT, no early warning

ALERT - Early warning sensor

Tape Position - Indicates RECORD/REPLAY records (counts gaps)

EXTERNAL MARKER

1. Pulse or level (RS232/TTL Interface)
2. (+) or (-) polarity
3. In RECORD mode marker is recorded with status. Stops recording at end of track 4 after which contains the marker in the MARK-mode.
4. In REPLAY mode maybe used by external device to stop replay.

SETUP SECTION

1. Bit rate selection for either record or replay.
2. RS232 Control Selection.
   - (A) With RS232 Control status ON, the six key RS232 control lines are multiplexed and recorded with the Tx and Rx Data. (Key control RTS, CTS, CDET DSR, DTR, ?)
   - (B) With RS232 Control status OFF only Tx and Rx Data are recorded and line recording per cartridge is increased by 50%.

STOP – IDLE MODE

A. Switch overrides RECORD or REPLAY

B. RECORD or REPLAY Auto Stop due to Marker, etc. Unit goes to STOP mode.

Rewind -- Activated only in STOP or REPLAY

Motion – FAST FORWARD - FAST REVERSE Activated only in STOP or REPLAY.

Appendix I
Front Panel, TTU

NOTES

NOTES

NOTES

NOTES

NOTES

NOTES

SI-842-5
File D05

DIAGNOSTIC TESTING
of
IPARS TERMINALS

with the IPARS INTERSHAKE System

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1 Introduction

The number of IPARS variations in use precludes developing a set of test programs that will satisfy the needs of all customers. The IPARS stored tests in INTERSHAKE PROM File D05 are basic programs that may require extensive revision for some applications.

This manual covers the IPARS modifications of the INTERSHAKE system (Sections 1 - 3) and the three factory-stored test programs in INTERSHAKE File D05 (Section 5). Those who want or need to revise these programs or write programs specific to their needs should consult the other INTERSHAKE system documentation. The following ARC publications should be used with the awareness that hardware changes for the IPARS modification invalidate some portions of the general documentation.

Operator's Manual, INTERSHAKE II, DTM-2 SERIES
Operator's Manual, Inter-KEY
Operator's Manual, INTERVIEW CRT and INTERVIEW II CRT
Program Function List for INTERSHAKE II

For this Manual, some fairly arbitrary choices in terminology had to be made.

For conciseness we refer throughout to IPARS, recognizing that some users may have preferred PARS, IPARS/PARS, or SABER. The CRC character is denoted CCC (cyclic check character). (Note that in other INTERSHAKE system documentation, which does not include the IPARS modifications, BCC and CRC are used.)

To keep terminology as consistent as practical with other INTERSHAKE system literature, Data is used for operand, and Function for operation code. In the text, as well as Inter-KEY program listings, instructions are always written in the order data-function; e.g., "Go to (Function 40) step 6A" is written 6A40.

Unless otherwise specified, as in some of the tables, all hexadecimal characters in the text are IPARS.

2 INTERSHAKE

2.1 Cyclic Check Character

Functions 38 (Start Receive BCC Calculations) and 58 (Start Transmit BCC Calculations) have been modified to include the IPARS CCC calculations. Data 25 used with either of these functions starts calculation of a valid CCC employing the IPARS polynomial $X^6 + X^5 + 1$; Data 32 selects an invalid character.

The IPARS modification does not affect Function 39 or 59. (See Appendix A, Functions 38 and 58, for further information.)

2.2 Synchronization

In IPARS the synchronization pattern is normally 111111 111110 (Sync 1, $3F_{16}$; Sync 2, $3E_{16}$); however, more than one 3F may be used.

The IPARS-modified INTERSHAKE-INTERVIEW synchronization circuits default to this two-character synchronization pattern when 6-bit, no parity operation (IPARS) is selected. The DTM-2 will then automatically delete the 3F characters from all CCC calculations but include 3E. The latter is also a valid reset character in IPARS and must be included in all calculations.

Although Function 90 must be used to enter synchronous mode, no data entry is necessary as the IPARS synchronization characters will be loaded automatically.

The INTERSHAKE assumes two synchronization characters, 3F, 3E, which allows full auto-synchronization (Function 95) capabilities.

2.3 Abutting Blocks

Whenever a cyclic redundancy check is programmed, Function 57 must be used before Function 59 (Send CCC).

Normally, for single blocks followed by idle 00 null, Function 57 need only be executed once near the start of a program, with 00 as its data.

However, when abutting blocks are being generated, a Function 57 must immediately precede each Function 59 and contain as its data the first character of the next block. For example, assume the following blocks are to be transmitted:

S1 S2	A B C	EOM CCC	D E F	EOM CCC	G A IA

Program as follows:

Character or Data	*Function*	*Description*
S1	50	Send Sync 1
S2	50	Send Sync 2
25	58	Start CCC calculation
A	50	Send A
B	50	Send B
C	50	Send C
EOM	50	Send one of the four possible EOMs
D	57	D will automatically follow the CCC
00	59	Send CCC
E	50	Send E
F	50	Send F
EOM	50	Send one of the four possible EOMs
GA	57	GA will automatically follow CCC
00	59	Send CCC

3 INTERVIEW

3.1 Display Variations

The IPARS language has been added to the standard ASCII, EBCDIC, Selectric, and EBCD languages in the INTERVIEW CRT. Reverse hexadecimal has replaced octal (see Appendix B). The IPARS user can display monitored data in the following forms:

(a) Clear text with control characters in line hexadecimal.
(b) Total line hexadecimal.
(c) Clear text with control characters in IPARS hexadecimal.
(d) Total IPARS hexadecimal.

Control characters are always shown in hexadecimal for easy correlation between the INTERSHAKE System and other monitoring devices and to facilitate comparison with textbook IPARS.

> **NOTE:** The INTERSHAKE must be set up for 6-bit, no parity operation to properly display reverse hexadecimal when the program is stopped or not in the run mode.

When IPARS has been selected, depressing the self-test button displays the entire character font, giving the operator quick access to any character in clear text, line hexadecimal, or IPARS hexadecimal.

3.2 Synchronization Circuits

The INTERVIEW synchronization circuits have been modified to allow proper synchronization on $3F_{16}$ $3E_{16}$ in half- or full-duplex operation.

4 Inter-KEY

4.1 Inter-KEY Codes

The extensive software changes necessary to accommodate IPARS made it necessary to drop Selectric from the IPARS Inter-KEY. However, the system stills retains ASCII, EBCDIC, and EBCD as standard program languages in addition to IPARS.

With the Inter-KEY, the operator uses IPARS hexadecimal to key in all character-related functions. The Inter-KEY performs automatic conversions between IPARS and line hexadecimal wherever required, so that operator confusion is minimal.

The IPARS control characters have been encoded into the keyboard: the operator does not have to convert them to hexadecimal. They may be accessed as follows:

Depressing	*and*	*Sends*	*IPARS hex*
Control key	CR	NL	0C
Control key	I	EOM-I	0D
Control key	G	GO AHEAD	0F
Control key	C	EOM-C	1D
Control key	S	SMI	1E
Control key	U	EOM-U	2D
Control key	P	EOM-PB	3D
Control key	V (SYN *)	SYNC 2	3E
Control key	O (SI *)	SYNC 1	3F
Control key	R	RESET	3E

* On these two keys, the mnemonic is the shift character.

A table of code conversions in relation to various system components is provided in Appendix C.

4.2 Mode 2

When IPARS language is employed in Mode 2, keyboard data will be correctly converted to the required line hexadecimal character to be transmitted or loaded into results memory.

4.3 Modes 3 and 4

Mode 3 is used to downline load, store, or print out programs from the INTERSHAKE test system; Mode 4, to receive programs. The user may elect to send, store, or print IPARS programs in either line or IPARS hexadecimal.

The operator will probably find it preferable to have programs printed out in the IPARS hexadecimal to which he is accustomed. The data will

then correlate with that viewed in the editor mode. to do this, key in 3, 4; press ENTER, and then key in the program ID code, followed by ENTER.

If the 4 is not keyed in, all character-related instructions will be printed in line hexadecimal.

When storing or downline loading programs, the operator need not care whether reverse or line hexadecimal is used. The important thing is that the program is received correctly. However, note that if Mode 3 is used to send, then Mode 4 must be used to receive; if Mode 34 is used to send, then Mode 44 must be used to receive.

4.4 Modes 5 and 6

Editor Modes 544 and 644 are used for 256-step and 128-step cells, respectively.

In the Editor mode, all data-related functions are displayed to the user in the IPARS hexadecimal form to which he is accustomed. Conversions to line hexadecimal are automatically done by the Inter-KEY when the program is loaded into the INTERSHAKE program memory for execution.

In the INTERSHAKE load and (or) play mode, IPARS programs will be displayed in the line hexadecimal configuration required for operation. In Inter-KEY editor mode, programs are once again displayed in IPARS hexadecimal. However, Function 52 or 53 may be used to send results memory to the INTERVIEW, which will display results memory data in line hexadecimal, clear text, or IPARS hexadecimal.

5 Firmware Stored Tests

5.1 File DO5 Orientation

The tests described in this section are furnished as factory-stored firmware programs, File DO5. Three PROMs are necessary, a Data (E) PROM, a Function (F) PROM, and a message (G) PROM. Four programs are stored on the File DO5 E and F PROMs:

Cell A-B	IPARS Monitor and CCC Test
Cell C-D	Emulate IPARS CPU or Terminal
Cell E-F	DTM-2 Self-Test
Cell G-H	IBM 3270 EBCDIC Test

Notice that each of these programs runs in the 256-step mode.

The message PROM content is as follows:

Function	*Message*	*No. Characters*
60	ASCII Fox	74
61	ASCII Fox	83
62	IPARS	62
63	EBCDIC	82
64	EBCDIC	124
65	EBCD	127
66	EBCDIC 3270	(Form)
67	EBCDIC 3270	(Form)

With each IPARS program, two Inter-KEY listings are included, one showing the program as displayed by the Inter-KEY in editor mode (i.e., with transmitted data in IPARS hexadecimal), and the other as the program is stored in INTERSHAKE program memory (all data in line hexadecimal). Remember that this distinction exists only for the IPARS programs, Cells A-B and C-D.

The Self-Test Program is written and displayed in ASCII.

For an in-depth discussion of the IBM 3270-Terminal program, refer to Atlantic Research Corporation document SI-842-2B, Protocol and Diagnostic Testing of 3270 (and 3275) Series Terminals.

5.2 Loading the Test

Loading and running the firmware stored tests is accomplished by the following procedure:

1. Press the INTERSHAKE LOAD button.
2. Place the MANUAL/SINGLE CYCLE/AUTO switch in AUTO position.
3. Set LOAD STORED TEST dial to cell selected.
4. Press the STEP button to clear display to Step 00.
5. Press ENTER. The selected program should now be loaded into Cell A-B of INTERSHAKE program memory, and the display will show the first instruction of the selected program.
6. Set AUTO switch back to MANUAL.
7. Return the cell selection switch to Cell A.
8. The selected program may now be run after following the panel setup instructions included in its description.

5.3 Program Addresses

Appendix D explains the relationship of INTERSHAKE program memory addresses and Inter-KEY program listings to the INTERSHAKE program sheets. It should be studied to facilitate reading and editing the programs.

5.4 IPARS Monitor and CCC Test (Cell A-B)

The test system may be connected at either the CPU site or the Terminal site. The data being monitored must be known in order to interpret the test results.

No matter where the monitor is connected, *outbound* is defined as CPU to Terminal; *inbound*, as Terminal to CPU. Thus RS-232 Pins 2 and 3 may be carrying either outbound or inbound data, depending on which end of the link is being considered.

Proper operation of the monitor program is dependent on correctly defining Pins 2 and 3 as inbound or outbound.

5.4.1 Panel Setup

Since the program uses the auto-panel functions to override the DTM-2 panel, only four panel settings are needed:

Panel Zone	*Setting*
3	CONTROL EIA switch: OFF
3	MON SIGS OUT switch: NORMAL
6	Counter input switch: EVENTS (10X)
6	Counter length switch: ANY, 10 - 10^8

Full-duplex data may be displayed by setting the INTERVIEW on FDX, although the program will monitor only outbound or inbound data.

5.4.2 Program Options

Program options are selected by setting the INTERSHAKE bit switches before the test is run. NOTE: Bit switches are sensed only at the start of the program.

The program options may be selected as follows:

Bit Switch	*Setting*	*Option*
One	ON	Causes program to freeze on error
Two	ON	Outbound data monitor
Two	OFF	Inbound data monitor
Three	ON	Display all data
Three	OFF	Program must be modified to select a specific IA or IA-TA combination
Four	ON	Monitor at terminal end of system
Four	OFF	Monitor at CPU end of system.

5.4.3 IA or IA-TA Selection

If the program is started with bit switch 3 off, the operator must enter the address (IA or IA-TA) of a specific station to be monitored. Only the data from that address will be displayed on the INTERVIEW.

The program step at which the IA must be entered is easily found. In the Editor mode, locate No-op instruction No. 4, 4298, by keying in the find command: F 4298 ALT ALT. The next instruction is 0346, Test for IA. The TA address follows No-op 5298. To enter the specific address(es) edit the program as follows:

Step	*Instruction Supplied*	*Modified for IA*	*Modified for IA-TA*
5F	6341	—	—
60	4298	—	—
61	0346	XX46 (Enter IA)	XX46 (Enter IA)
62	6C40	—	—
63	0298	3094	0298
64	6841	—	—
65	5298	—	—
66	2444	—	XX44 (Enter TA)
67	6C40	—	—

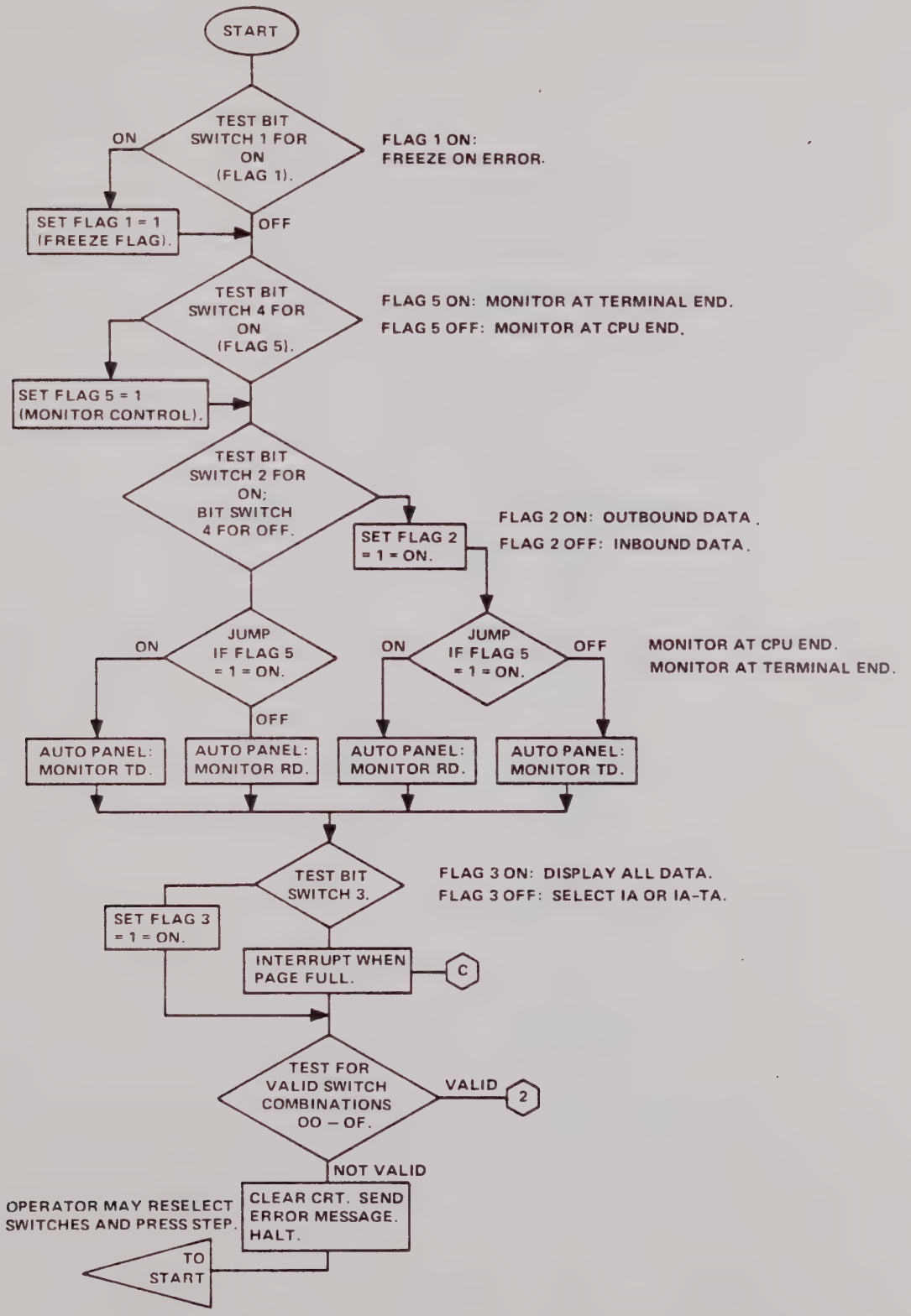
5.4.4 Count N Blocks

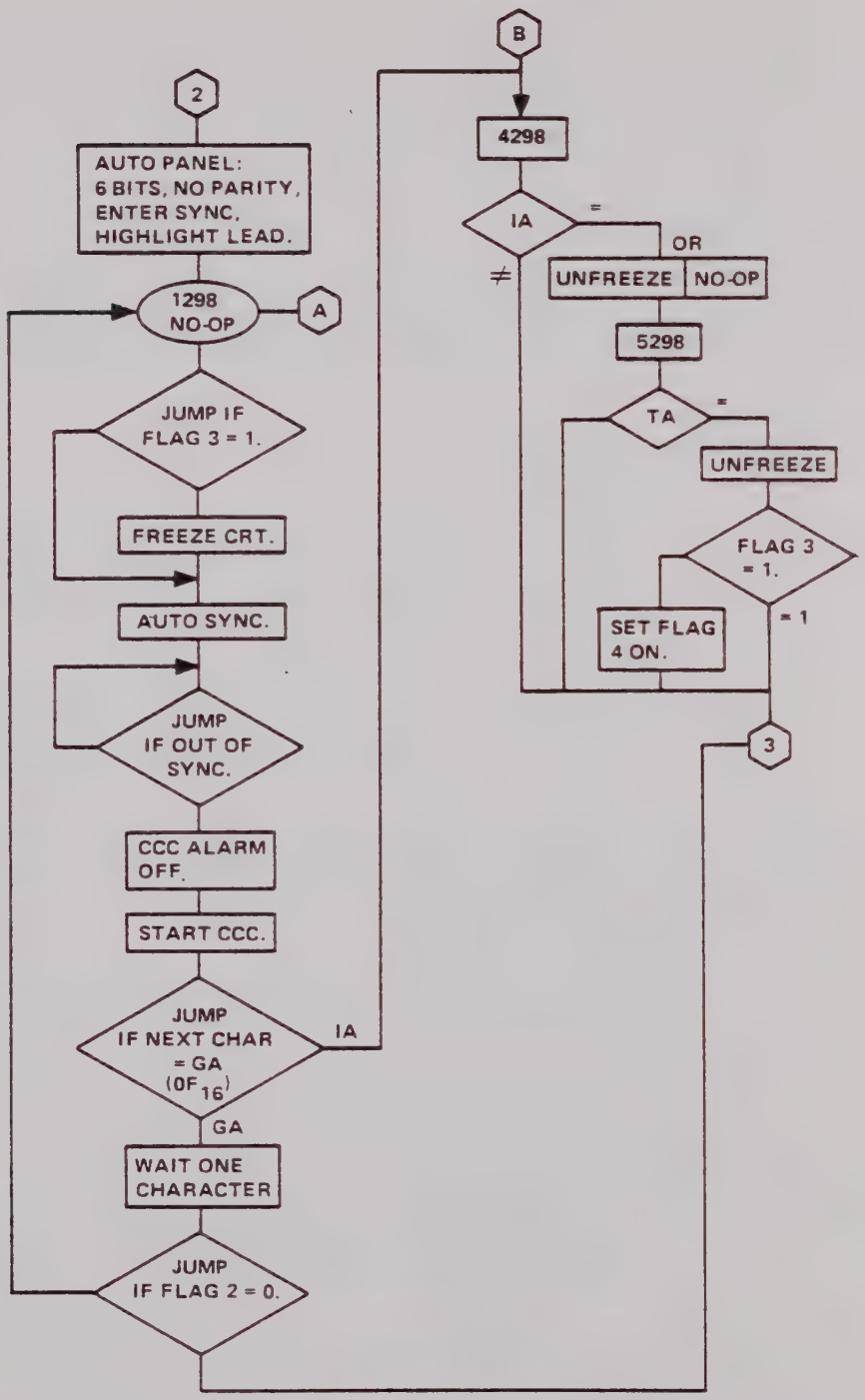
When the counter input switch is in the EVENTS (10X) position, the length switch selects the number of blocks, in the range 10 to 10^8, on which to test CCC. When the END flag comes on, the program will stop at Function 99 with the COMPLETE light on.

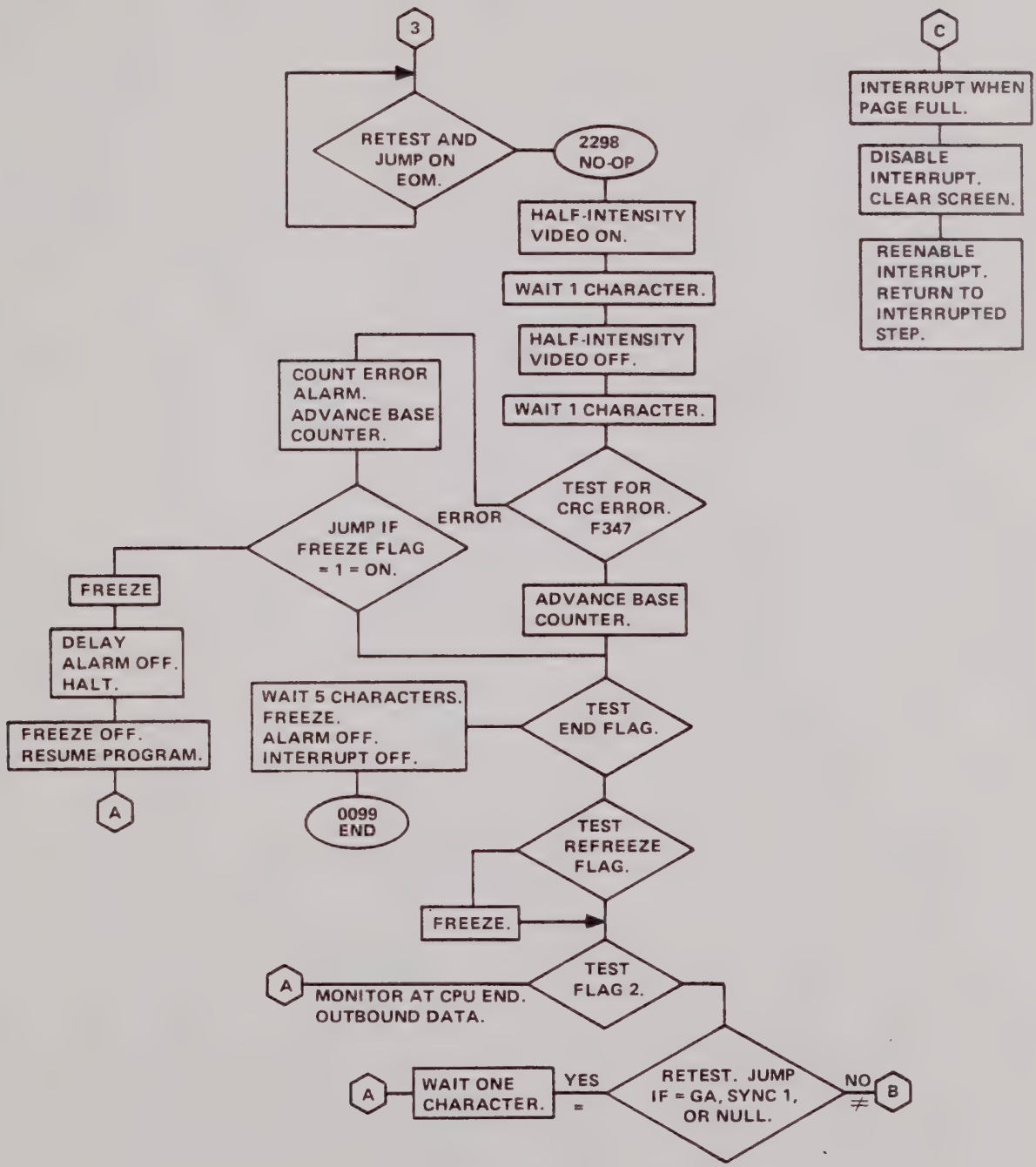
5.4.5 Manual Overrides

If Bit Switch 1 in ON at the start, Flag 1 is set to 1. This causes the display to freeze on the first error. Depressing the STEP button causes the program to resume monitoring and displaying data.

5.4.6 *Program Flow Diagram*




2
AUTO PANEL:
6 BITS, NO PARITY,
ENTER SYNC,
HIGHLIGHT LEAD.
1298
NO-OP
A
JUMP IF
FLAG 3 = 1.
FREEZE CRT.
AUTO SYNC.
JUMP
IF OUT OF
SYNC.
CCC ALARM
OFF.
START CCC.
JUMP
IF NEXT CHAR
= GA
(0F16)
IA
GA
WAIT ONE
CHARACTER
JUMP
IF FLAG 2 = 0.
B
4298
IA
=
≠
OR
UNFREEZE
NO-OP
5298
TA
=
UNFREEZE
FLAG 3
= 1.
= 1
SET FLAG
4 ON.
3


3
RETEST AND JUMP ON EOM.
2298 NO-OP
HALF-INTENSITY VIDEO ON.
WAIT 1 CHARACTER.
HALF-INTENSITY VIDEO OFF.
WAIT 1 CHARACTER.
TEST FOR CRC ERROR. F347
ERROR
COUNT ERROR ALARM. ADVANCE BASE COUNTER.
JUMP IF FREEZE FLAG = 1 = ON.
FREEZE
DELAY ALARM OFF. HALT.
FREEZE OFF. RESUME PROGRAM.
A
ADVANCE BASE COUNTER.
WAIT 5 CHARACTERS. FREEZE. ALARM OFF. INTERRUPT OFF.
0099 END
TEST END FLAG.
TEST REFREEZE FLAG.
FREEZE.
A
MONITOR AT CPU END. OUTBOUND DATA.
TEST FLAG 2.
A
WAIT ONE CHARACTER.
YES =
RETEST. JUMP IF = GA, SYNC 1, OR NULL.
NO ≠
B
C
INTERRUPT WHEN PAGE FULL.
DISABLE INTERRUPT. CLEAR SCREEN.
REENABLE INTERRUPT. RETURN TO INTERRUPTED STEP.

5.4.7 *Program*

INTERSHAKE II PROGRAM

TITLE: IPARS Monitor and CCC Test

FILE NO. 005 | SHEET 1 OF 4

DESCRIPTION:

PROGRAM LOCATION | DTM S/N | CELL A - B | RAM | PROM

OBJECTIVE:

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP
C 8 4 (0)	0	0	02	08	No-op.	
	1	1	0C	41	Load address register.	
	2	2	01	06	Test bit switch 1 for ON.	
	3	3	03	06	Test bit switch 1 for ON.	
	4	4	05	06	Test bit switch 1 for ON.	
	5	5	07	06	Test bit switch 1 for ON.	
	6	6	09	06	Test bit switch 1 for ON.	
	7	7	0B	06	Test bit switch 1 for ON.	
	8	8	0D	06	Test bit switch 1 for ON.	
	9	9	0F	06	Test bit switch 1 for ON.	
	A	10	0C	06	Test bit switch 1 for ON.	
	B	11	0D	40	Go to address 0D.	
	C	12	11	47	Set Flag 1 = 1.	
	D	13	16	41	Load address register.	
	E	14	08	06	Test bit switch 4 for ON.	
	F	15	09	06	Test bit switch 4 for ON.	
D 9 5 (1)	0	16	0A	06	Test bit switch 4 for ON.	
	1	17	0B	06	Test bit switch 4 for ON.	
	2	18	0C	06	Test bit switch 4 for ON.	
	3	19	0D	06	Test bit switch 4 for ON.	
	4	20	0E	06	Test bit switch 4 for ON.	
	5	21	0F	06	Test bit switch 4 for ON.	
	6	22	18	40	Go to address 18.	
	7	23	51	06	Set Flag 5 = 1.	
	8	24	26	41	Load address register.	
	9	25	02	06	Test bit switch 2 for ON.	
	A	26	03	06	Test bit switch 2 for ON.	
	B	27	03	06	Test bit switch 2 for ON.	
	C	28	0A	06	Test bit switch 2 for ON.	
	D	29	0B	06	Test bit switch 2 for ON.	
	E	30	0E	06	Test bit switch 2 for ON.	
	F	31	0F	06	Test bit switch 2 for ON.	

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

CODE: IPARS

SPEED: ANY

ASYNC / (SYNC)

SYN CHARACTER: 3F 3E

STOP BIT: ~~1.0 , 1.5 , 2.0~~

INFO BITS: 5 , (6) , 7 , 8

PARITY: (NONE) ODD , EVEN

~~CONTROL EIA / OFF~~

ON-LINE: TD/RD (TD , RD)

OFF-LINE: ~~TERM + MODEM~~

MON SIGS (NORMAL)

PATCH CORDS: None

CONTROL EIA (V. 24): None

COUNTER ZONE: Events 10^X

INTERRUPTS: CRT page full

FLAGS: 1,2,3,4,5

LATCH: None

CONTINUE ON OTHER SIDE

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CONTINUE ON OTHER SIDE

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNC-TION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
E A 6 (2)	0	32	07	06	Test bit switch 2 for ON.	
	1	33	25	41	Load Address Register.	
	2	34	53	47	Jump if Flag 5 = 1.	
	3	35	DA	93	Auto panel.	
	4	36	2D	40	Go to address 2D.	
	5	37	BA	93	Auto panel.	
	6	38	2D	40	Go to address 2D.	
	7	39	21	47	Set Flag 2 = 1.	
	8	40	2C	41	Load address register.	
	9	41	53	47	Jump if Flag 5 = 1.	
	A	42	BA	93	Auto panel.	
	B	43	2D	40	Go to address 2D.	
	C	44	DA	93	Auto panel.	
	D	45	38	41	Load address register.	
	E	46	04	06	Test bit switch 3 for ON.	
	F	47	05	06	Test bit switch 3 for ON.	
F B 7 (3)	0	48	06	06	Test bit switch 3 for ON.	
	1	49	07	06	Test bit switch 3 for ON.	
	2	50	0C	06	Test bit switch 3 for ON.	
	3	51	0D	06	Test bit switch 3 for ON.	
	4	52	0E	06	Test bit switch 3 for ON.	
	5	53	0F	06	Test bit switch 3 for ON.	
	6	54	72	98	No-op No. 7.	
	7	55	39	40	Go-to Address 39.	
	8	56	31	47	Set Flag 3 = 1.	
	9	57	4B	41	Load address register.	
	A	58	00	06	Test bit switches for invalid selection.	
	B	59	01	06	Test bit switches for invalid selection.	
	C	60	02	06	Test bit switches for invalid selection.	
	D	61	03	06	Test bit switches for invalid selection.	
	E	62	04	06	Test bit switches for invalid selection.	
	F	63	05	06	Test bit switches for invalid selection.	

FILE NO. DO5
SHEET 1 OF 4
PROGRAM LOCATION
DTM S/N
CELL A - B
RAM
PROM
ADDITIONAL INFORMATION (WRITE IN)

ADDITIONAL REMARKS

PROGRAM WRITTEN BY: DATE

COMPANY NAME: TEL. NO.

ADDRESS:

FORM NO. TP-139-6-77

INTERSHAKE II PROGRAM

TITLE:

FILE NO. 005
SHEET 2 OF 4

DESCRIPTION:

PROGRAM LOCATION
DTM S/N
CELL A - B
RAM
PROM

OBJECTIVE:

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C 8 (4) 0	0	0	06	06	Test bit switches for invalid selection.	
	1	1	07	06	Test bit switches for invalid selection.	
	2	2	08	06	Test bit switches for invalid selection.	
	3	3	09	06	Test bit switches for invalid selection.	
	4	4	0A	06	Test bit switches for invalid selection.	
	5	5	0B	06	Test bit switches for invalid selection.	
	6	6	0C	06	Test bit switches for invalid selection.	
	7	7	0D	06	Test bit switches for invalid selection.	
	8	8	0E	06	Test bit switches for invalid selection.	
	9	9	0F	06	Test bit switches for invalid selection.	
	A	10	A1	40	Go to address A1.	
	B	11	68	91	Auto panel: sync, 6 bit, no parity.	
	C	12	00	90	Load sync mode.	
	D	13	5B	94	Reverse video on selected test point.	
	E	14	12	98	No-op No. 1.	
	F	15	52	41	Load address register.	
D 9 (5) 1	0	16	33	47	Jump if Flag 3 = 1.	
	1	17	31	94	Freeze CRT.	
	2	18	12	95	Auto sync.	
	3	19	53	41	Load address register.	
	4	20	D3	47	Jump if out of sync.	
	5	21	03	71	Turn off alarm and CONTROL OUT test point.	
	6	22	40	47	Set Flag 4 = Ø.	
	7	23	25	38	Start CCC calculation.	
	8	24	5B	41	Load address register.	
	9	25	0F	44	Jump if = 0F (GA).	
	A	26	5F	40	Go to address 5F.	
	B	27	01	14	Wait 1 character.	
	C	28	4E	41	Load address register.	
	D	29	22	47	Jump if Flag 2 = Ø.	
	E	30	6C	40	Go to address 6C.	
	F	31	63	41	Load address register.	

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

- CODE
- SPEED
- ASYNC / SYNC
- SYN CHARACTER
- STOP BIT 1.0 , 1.5 , 2.0
- INFO BITS 5 , 6 , 7 , 8
- PARITY NONE , ODD , EVEN
- CONTROL EIA / OFF
- ON-LINE TD/RD , TD , RD
- OFF-LINE TERM / MODEM
- MON SIGS / NORMAL
- PATCH CORDS
- CONTROL EIA (V. 24)
- COUNTER ZONE
- INTERRUPTS
- FLAGS
- LATCH

CONTINUE ON OTHER SIDE

CONTINUE ON OTHER SIDE

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNC. TION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
E A 6 2	0	32	42	98	No-op No. 4 (IA locator).	
	1	33	03	46	Retest and jump if = 03 (IA).	
	2	34	6C	40	Go to address 6C.	
	3	35	02	98	No-op.	
	4	36	68	41	Load address register.	
	5	37	52	98	No-op No. 5 (TA locator).	
	6	38	24	44	Jump if = TA address.	
	7	39	6C	40	Go to address 6C.	
	8	40	30	94	Unfreeze CRT.	
	9	41	6C	41	Load address register.	
	A	42	33	47	Jump if Flag 3 = 1.	
	B	43	41	47	Set Flag 4 = 1.	
	C	44	74	41	Load address register.	
	D	45	0D	44	Jump if = EOM.	
	E	46	1D	46	Jump if = EOM.	
	F	47	2D	46	Jump if = EOM.	
F B 7 3	0	48	3D	46	Jump if = EOM.	
	1	49	6C	40	Go to address 6C.	
	2	50	00	00	Halt.	
	3	51	00	00	Halt.	
	4	52	22	98	No-op No. 2.	
	5	53	61	94	Half-intensity video ON.	
	6	54	01	14	Wait 1 character (CCC).	
	7	55	60	94	Half-intensity video OFF.	
	8	56	01	14	Wait 1 character.	
	9	57	8C	41	Load address register.	
	A	58	F3	47	Test CCC for error (jump if).	
	B	59	00	85	Advance base count.	
	C	60	9A	41	Load address register.	
	D	61	B3	47	Jump if end counter = ON.	
	E	62	81	41	Load address register.	
	F	63	43	47	Jump if Flag 4 = 1.	

FILE NO. D05
SHEET 2B OF 4
PROGRAM LOCATION
DTM S/N
CELL A - B
RAM
PROM
ADDITIONAL INFORMATION (WRITE IN)

ADDITIONAL REMARKS

PROGRAM WRITTEN BY: DATE

COMPANY NAME: TEL. NO.

ADDRESS:

FORM NO. TP-139-6-77

INTERSHAKE II PROGRAM

TITLE:

FILE NO. 005
SHEET 3 OF 4

DESCRIPTION:

PROGRAM LOCATION
DTM S/N
CELL A - B
RAM
PROM

OBJECTIVE:

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNC-TION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C 8 4 0	0	0	83	40	Go to address 83.	
	1	1	31	94	Freeze CRT.	
	2	2	10	47	Set Flag 1 = 0.	
	3	3	4E	41	Load address register.	
	4	4	23	47	Jump if Flag 2=1.	
	5	5	8A	41	Load address register.	
	6	6	0F	46	Retest and jump if last character = GA.	
	7	7	3F	46	Retest and jump if last character = Sync 1.	
	8	8	00	46	Retest and jump if last character = null.	
	9	9	60	40	Go to address 60.	
	A	10	01	14	Wait 1 character.	
	B	11	4E	40	Go to address 4E.	
	C	12	32	98	No-op No. 3.	
	D	13	03	87	Add 1 to event count.	
	E	14	03	70	Turn on alarm and CONTROL OUT test point.	
	F	15	00	85	Advance base count.	
D 9 5 1	0	16	93	41	Load address register.	
	1	17	13	47	Jump if Flag 1 = 1.	
	2	18	7C	40	Go to address 7C.	
	3	19	31	94	Freeze CRT.	
	4	20	03	82	Wait 300 ms.	
	5	21	03	71	Turn off alarm and CONTROL OUT test point.	
	6	22	00	00	Halt.	
	7	23	30	94	Unfreeze CRT.	
	8	24	4E	40	Go to address 4E.	
	9	25	00	00	Halt.	
	A	26	05	14	Wait 5 characters.	
	B	27	31	94	Freeze CRT.	
	C	28	03	71	Turn on alarm and CONTROL OUT test point.	
	D	29	08	97	Turn off interrupt.	
	E	30	02	98	No-op.	
	F	31	00	99	End.	

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

- CODE
- SPEED
- ASYNC / SYNC
- SYN CHARACTER
- STOP BIT 1.0 , 1.5 , 2.0
- INFO BITS 5 , 6 , 7 , 8
- PARITY NONE , ODD , EVEN
- CONTROL EIA / OFF
- ON-LINE TD/RD , TD , RD
- OFF-LINE TERM / MODEM
- MON SIGS / NORMAL
- PATCH CORDS
- CONTROL EIA (V. 24)
- COUNTER ZONE
- INTERRUPTS
- FLAGS
- LATCH

CONTINUE ON OTHER SIDE

CONTINUE ON OTHER SIDE

ADDRESS (PAGE (CIRCLE ONE) 3 (2) 1 0)		ENTRY STEP	ENTRY DATA	ENTRY FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP
E (A) 6 2	0	32	00	00	Halt.	
	1	33	30	94	Unfreeze CRT.	
	2	34	01	94	} Clear CRT.	
	3	35	02	80		
	4	36	00	94		
	5	37	1C	50	Send space.	
	6	38	1C	50	Send space.	
	7	39	1C	50	Send space.	
	8	40	32	50	Send B.	
	9	41	39	50	Send I.	
	A	42	13	50	Send T.	
	B	43	1C	50	Send space.	
	C	44	12	50	Send S.	
	D	45	16	50	Send W.	
	E	46	39	50	Send I.	
	F	47	13	50	Send T.	
F (B) 7 3	0	48	33	50	Send C.	
	1	49	38	50	Send H.	
	2	50	1C	50	Send space.	
	3	51	35	50	Send E.	
	4	52	29	50	Send R.	
	5	53	29	50	Send R.	
	6	54	26	50	Send O.	
	7	55	29	50	Send R.	
	8	56	1C	50	Send space.	
	9	57	1C	50	Send space.	
	A	58	1C	50	Send space.	
	B	59	31	94	Freeze CRT.	
	C	60	00	00	Halt.	
	D	61	30	94	Unfreeze CRT.	
	E	62	00	40	Go to address 00.	
	F	63	00	00	Halt.	

FILE NO. 005
SHEET 38 OF 4
PROGRAM LOCATION
DTM S/N
CELL A - B
RAM
PROM
ADDITIONAL INFORMATION (WRITE IN)

ADDITIONAL REMARKS

PROGRAM WRITTEN BY: DATE

COMPANY NAME: TEL. NO.

ADDRESS:

FORM NO. TP-139-6-77

INTERSHAKE II PROGRAM

TITLE:

FILE NO. D05
SHEET 4 OF 4

DESCRIPTION:

PROGRAM LOCATION
DTM S/N
CELL A - B
RAM
PROM

OBJECTIVE:

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP
C 8 4 0	0	0	00	76	Disable interface interrupt.	
	1	1	01	94	Clear CRT.	
	2	2	00	94	Clear CRT.	
	3	3	01	75	Interrupt, page full.	
	4	4	01	98	Return to interrupted step.	
	5	5	E1	E1	End of file.	
	6	6				
	7	7				
	8	8				
	9	9				
	A	10				
	B	11				
	C	12				
	D	13				
	E	14				
	F	15				
D 9 5 1	0	16				
	1	17				
	2	18				
	3	19				
	4	20				
	5	21				
	6	22				
	7	23				
	8	24				
	9	25				
	A	26				
	B	27				
	C	28				
	D	29				
	E	30				
	F	31				

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

CODE

SPEED

ASYNC / SYNC

SYN CHARACTER

STOP BIT
1.0 , 1.5 , 2.0

INFO BITS
5 , 6 , 7 , 8

PARITY
NONE , ODD , EVEN

CONTROL EIA / OFF

ON-LINE
TD/RD , TD , RD

OFF-LINE
TERM / MODEM

MON SIGS / NORMAL

PATCH CORDS

CONTROL EIA (V. 24)

COUNTER ZONE

INTERRUPTS

FLAGS

LATCH

CONTINUE ON OTHER SIDE

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CONTINUE ON OTHER SIDE

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
E A 6 2	0	32				
	1	33				
	2	34				
	3	35				
	4	36				
	5	37				
	6	38				
	7	39				
	8	40				
	9	41				
	A	42				
	B	43				
	C	44				
	D	45				
	E	46				
	F	47				
F B 7 3	0	48				
	1	49				
	2	50				
	3	51				
	4	52				
	5	53				
	6	54				
	7	55				
	8	56				
	9	57				
	A	58				
	B	59				
	C	60	C0	40	Go to address C0.	
	D	61				
	E	62				
	F	63				

FILE NO. D05
SHEET 4 BOF 4
PROGRAM LOCATION
DTM S/N
CELL A - B
RAM
PROM
ADDITIONAL INFORMATION (WRITE IN)

ADDITIONAL REMARKS

PROGRAM WRITTEN BY: DATE

COMPANY NAME: TEL. NO.

ADDRESS:

FORM NO. TP-139-6-77

5.4.8 *Inter-KEY Program Listing as Viewed by Editor (IPARS hexadecimal)*

```
Ag
0298 nop  0606 JSW  8340 JMP  0076 INT
0C41 PRE  0706 JSW  3194 AUX  0194 AUX
0106 JSW  0806 JSW  1047 FLG  0094 AUX
0306 JSW  0906 JSW  4E41 PRE  0175 INT
0506 JSW  0A06 JSW  2347 JFG  0198 nop
0706 JSW  0B06 JSW  8A41 PRE  E1E1 EOF
0906 JSW  0C06 JSW  0F46 RTJ  0000 HLT
0B06 JSW  0D06 JSW  3F46 RTJ  0000 HLT

0B06 JSW  0E06 JSW  0046 RTJ  0000 HLT
0F06 JSW  0F06 JSW  5F40 JMP  0000 HLT
0C06 JSW  A140 JMP  0114 REC  0000 HLT
0D40 JMP  6891 AUT  4E40 JMP  0000 HLT
1147 FLG  0090 SYN  3298 nop  0000 HLT
1741 PRE  5B94 AUX  0387 CTR  0000 HLT
0B06 JSW  1298 nop  0370 232  0000 HLT
0906 JSW  5241 PRE  0085 CTR  0000 HLT

0A06 JSW  3347 JFG  9341 PRE  0000 HLT
0B06 JSW  3194 AUX  1347 JFG  0000 HLT
0C06 JSW  1295 SYN  7C40 JMP  0000 HLT
0D06 JSW  5341 PRE  3194 AUX  0000 HLT
0E06 JSW  D347 JFG  0382 DLY  0000 HLT
0F06 JSW  0371 232  0371 232  0000 HLT
1B40 JMP  4047 FLG  0000 HLT  0000 HLT
5147 FLG  2538 BCC  3094 AUX  0000 HLT

2741 PRE  5B41 PRE  4E40 JMP  0000 HLT
0206 JSW  0F44 JEC  0000 HLT  0000 HLT
0306 JSW  5F40 JMP  0514 REC  0000 HLT
0606 JSW  0114 REC  3194 AUX  0000 HLT
0A06 JSW  4E41 PRE  0371 232  0000 HLT
0B06 JSW  2247 JFG  0897 INT  0000 HLT
0E06 JSW  6C40 JMP  0298 nop  0000 HLT
0F06 JSW  6341 PRE  0099 END  0000 HLT

0706 JSW  4298 nop  0000 HLT  0000 HLT
2541 PRE  0346 RTJ  3094 AUX  0000 HLT
5347 JFG  6C40 JMP  0194 AUX  0000 HLT
DA93 AUT  0298 nop  0280 DLY  0000 HLT
2D40 JMP  6B41 PRE  0094 AUX  0000 HLT
BA93 AUT  5298 nop  1C50 XMT  0000 HLT
2D40 JMP  2444 JEC  1C50 XMT  0000 HLT
2147 FLG  6C40 JMP  1C50 XMT  0000 HLT

2C41 PRE  3094 AUX  3250 XMT  0000 HLT
5347 JFG  6C41 PRE  3950 XMT  0000 HLT
BA93 AUT  3347 JFG  1350 XMT  0000 HLT
2D40 JMP  4147 FLG  1C50 XMT  0000 HLT
DA93 AUT  7441 PRE  1250 XMT  0000 HLT
3841 PRE  0D44 JEC  1650 XMT  0000 HLT
0406 JSW  1D46 RTJ  3950 XMT  0000 HLT
0506 JSW  2D46 RTJ  1350 XMT  0000 HLT

0606 JSW  3D46 RTJ  3350 XMT  0000 HLT
0706 JSW  6C40 JMP  3850 XMT  0000 HLT
0C06 JSW  0000 HLT  1C50 XMT  0000 HLT
0B06 JSW  0000 HLT  3550 XMT  0000 HLT
0E06 JSW  2298 nop  2950 XMT  0000 HLT
0F06 JSW  6194 AUX  2950 XMT  0000 HLT
7298 nop  0114 REC  2650 XMT  0000 HLT
3940 JMP  6094 AUX  2950 XMT  0000 HLT

3147 FLG  0114 REC  1C50 XMT  0000 HLT
4B41 PRE  8C41 PRE  1C50 XMT  0000 HLT
0006 JSW  F347 JFG  1C50 XMT  0000 HLT
0106 JSW  0085 CTR  3194 AUX  0000 HLT
0206 JSW  9A41 PRE  0000 HLT  C040 JMP
0306 JSW  B347 JFG  3094 AUX  0000 HLT
0406 JSW  8141 PRE  0040 JMP  0000 HLT
0506 JSW  4347 JFG  0000 HLT  0000 HLT
se
```

5.4.9 *Inter-KEY Listing as Loaded from E and F PROMs (line hexadecimal)*

```
Ag
0298 nop  0606 JSW  8340 JMP  0076 INT
0C41 PRE  0706 JSW  3194 AUX  0194 AUX
0106 JSW  0806 JSW  1047 FLG  0094 AUX
0306 JSW  0906 JSW  4E41 PRE  0175 INT
0506 JSW  0A06 JSW  2347 JFG  0198 nop
0706 JSW  0B06 JSW  8A41 PRE  E1E1 EOF
0906 JSW  0C06 JSW  3C46 RTJ  0000 HLT
0B06 JSW  0B06 JSW  3F46 RTJ  0000 HLT

0B06 JSW  0E06 JSW  0046 RTJ  0000 HLT
0F06 JSW  0F06 JSW  5F40 JMP  0000 HLT
0C06 JSW  A140 JMP  0114 REC  0000 HLT
0B40 JMP  6B91 AUT  4E40 JMP  0000 HLT
1147 FLG  0090 SYN  3298 nop  0000 HLT
1741 PRE  5B94 AUX  0387 CTR  0000 HLT
0B06 JSW  1298 nop  0370 232  0000 HLT
0906 JSW  5241 PRE  0085 CTR  0000 HLT

0A06 JSW  3347 JFG  9341 PRE  0000 HLT
0B06 JSW  3194 AUX  1347 JFG  0000 HLT
0C06 JSW  1295 SYN  7C40 JMP  0000 HLT
0B06 JSW  5341 PRE  3194 AUX  0000 HLT
0E06 JSW  B347 JFG  0382 DLY  0000 HLT
0F06 JSW  0371 232  0371 232  0000 HLT
1B40 JMP  4047 FLG  0000 HLT  0000 HLT
5147 FLG  2538 BCC  3094 AUX  0000 HLT

2741 PRE  5B41 PRE  4E40 JMP  0000 HLT
0206 JSW  3C44 JEC  0000 HLT  0000 HLT
0306 JSW  5F40 JMP  0514 REC  0000 HLT
0606 JSW  0114 REC  3194 AUX  0000 HLT
0A06 JSW  4E41 PRE  0371 232  0000 HLT
0B06 JSW  2247 JFG  0897 INT  0000 HLT
0E06 JSW  6C40 JMP  0298 nop  0000 HLT
0F06 JSW  6341 PRE  0099 END  0000 HLT

0706 JSW  4298 nop  0000 HLT  0000 HLT
2541 PRE  3046 RTJ  3094 AUX  0000 HLT
5347 JFG  6C40 JMP  0194 AUX  0000 HLT
DA93 AUT  0298 nop  0280 DLY  0000 HLT
2D40 JMP  6B41 PRE  0094 AUX  0000 HLT
BA93 AUT  5298 nop  0E50 XMT  0000 HLT
2D40 JMP  0944 JEC  0E50 XMT  0000 HLT
2147 FLG  6C40 JMP  0E50 XMT  0000 HLT

2C41 PRE  3094 AUX  1350 XMT  0000 HLT
5347 JFG  6C41 PRE  2750 XMT  0000 HLT
BA93 AUT  3347 JFG  3250 XMT  0000 HLT
2D40 JMP  4147 FLG  0E50 XMT  0000 HLT
DA93 AUT  7441 PRE  1250 XMT  0000 HLT
3841 PRE  2C44 JEC  1A50 XMT  0000 HLT
0406 JSW  2E46 RTJ  2750 XMT  0000 HLT
0506 JSW  2D46 RTJ  3250 XMT  0000 HLT

0606 JSW  2F46 RTJ  3350 XMT  0000 HLT
0706 JSW  6C40 JMP  0750 XMT  0000 HLT
0C06 JSW  0000 HLT  0E50 XMT  0000 HLT
0B06 JSW  0000 HLT  2B50 XMT  0000 HLT
0E06 JSW  2298 nop  2550 XMT  0000 HLT
0F06 JSW  6194 AUX  2550 XMT  0000 HLT
7298 nop  0114 REC  1950 XMT  0000 HLT
3940 JMP  6094 AUX  2550 XMT  0000 HLT

3147 FLG  0114 REC  0E50 XMT  0000 HLT
4B41 PRE  8C41 PRE  0E50 XMT  0000 HLT
0006 JSW  F347 JFG  0E50 XMT  0000 HLT
0106 JSW  0085 CTR  3194 AUX  0000 HLT
0206 JSW  9A41 PRE  0000 HLT  C040 JMP
0306 JSW  B347 JFG  3094 AUX  0000 HLT
0406 JSW  8141 PRE  0040 JMP  0000 HLT
0506 JSW  4347 JFG  0000 HLT  0000 HLT
s`
```

5.5 Emulate CPU or Terminal (Cell C-D)

5.5.1 Panel Setup

To emulate either a CPU or a terminal, the INTERSHAKE test system may be connected to the DTE equipment to be tested either (1) directly; or (2) via a modem. The respective INTERSHAKE panel settings follow:

Panel Zone	*(1) Terminal Connection*	*(2) Modem Connection*
Top	Connect terminal to the terminal connector on the DTM-2	Connect modem to modem connector on DTM-2
1	Select internal clock desired	Select EXT clock (Test will run at modem speed).
1	Select SYNC	Select SYNC
1	INFO BITS: 6	INFO BITS: 6
1	PARITY BIT: NONE	PARITY BIT: NONE
3	CONTROL EIA switch: OFF	CONTROL EIA switch: OFF
3	Mode: TERMINAL	Mode: MODEM
3	MON SIGS OUT switch: NORMAL	MON SIGS OUT switch: NORMAL
5	CTS, DSR, RLSD on (up)	RTS, DTR on (up)
2	EIA/MIL: MIL	EIA/MIL: MIL

5.5.2 IA or IA-TA Selection

Before an emulative program can be run the address of the terminal to be tested must be inserted into the program. The user has two options for doing this.

Option 1. The program may be edited to change only those 0052 program instructions that follow 0049 to Data (IA address) Function 50. For example,

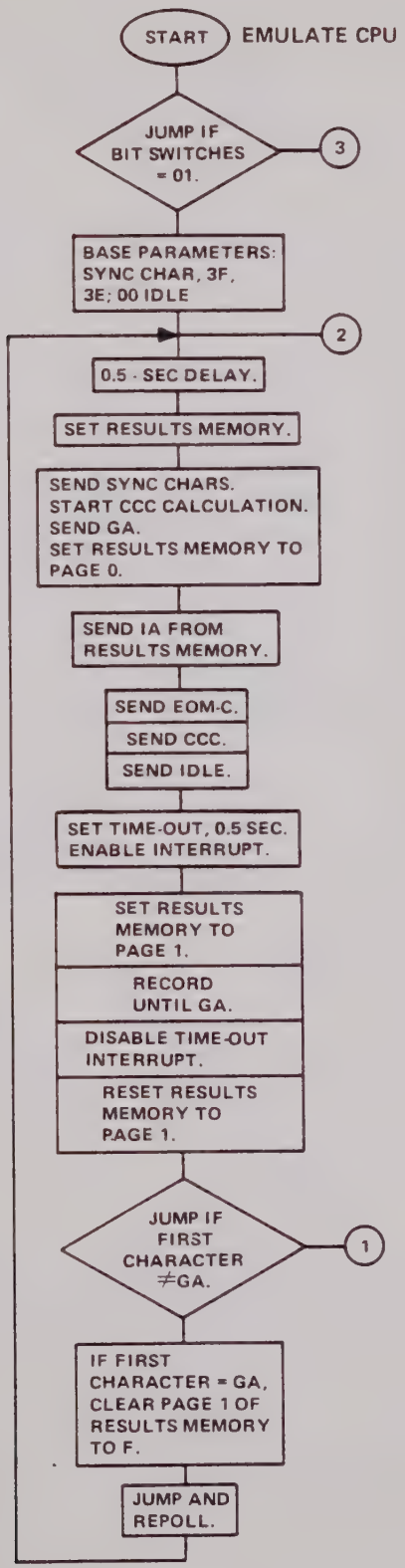
	Program		*As Edited*	
Step	*Data*	*Function*	*Data*	*Function*
10	00	49	00	49
11	00	52	(IA)	50

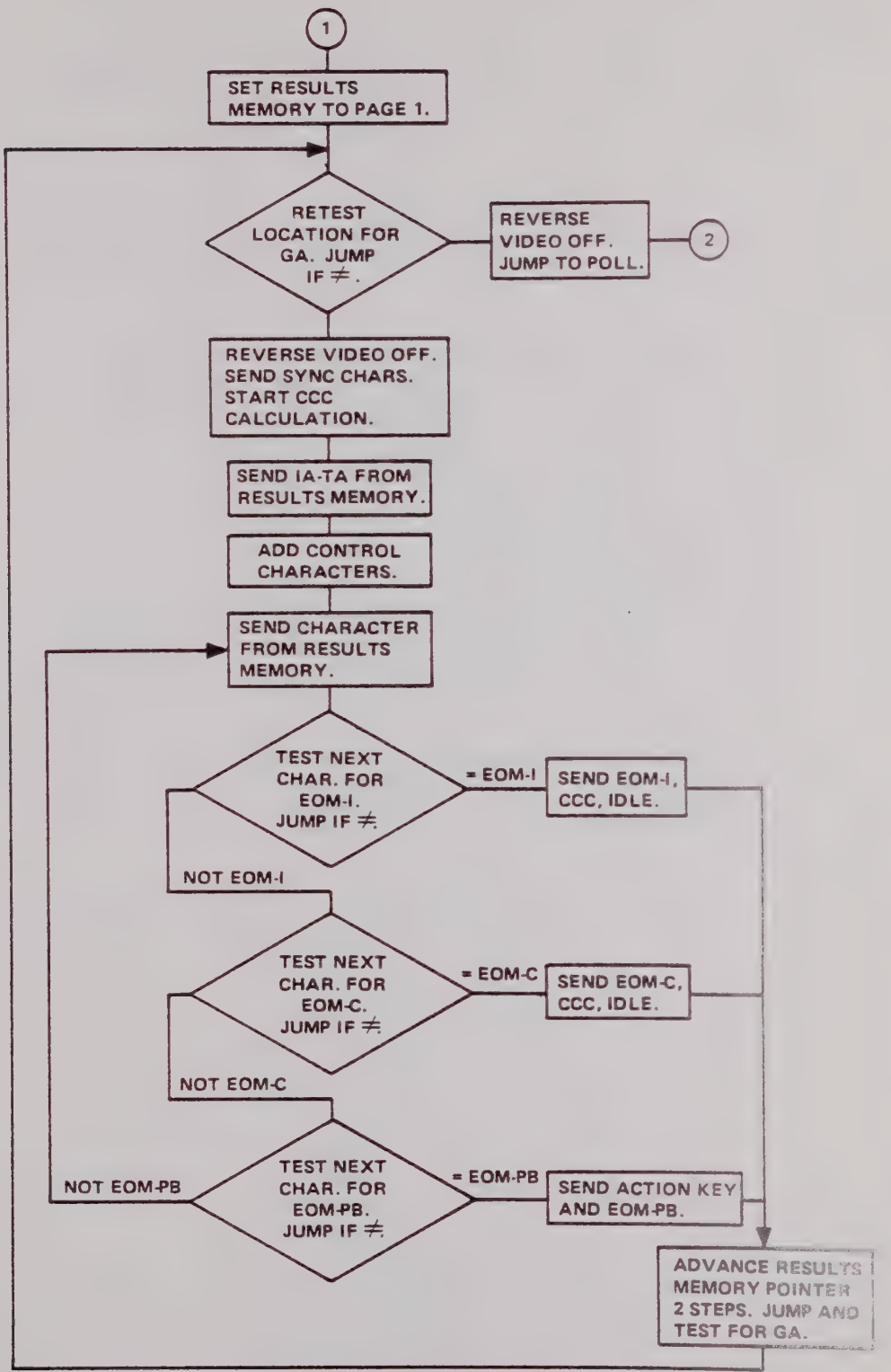
Option 2. The IA can be entered into the first position of Results Memory (RM) via Mode 2 of the InterKEY. Then the program entry 0049 will set the RM pointer to the first position of Page 0, Step 00. Function 50 then will send the IA as a subroutine each time the IA is required. The procedure for entering the IA in results memory is as follows:

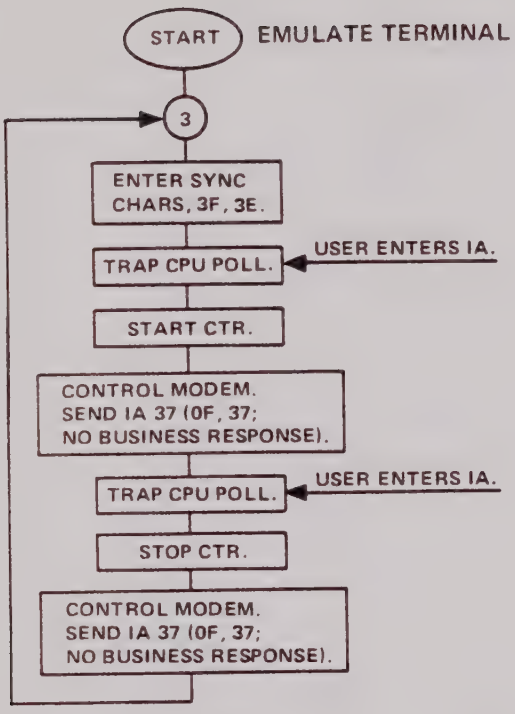
1. Enter Mode 2.
2. Depress KYBD button (INTERSHAKE Zone 4).
3. Key in 544; set the bit switches to FO_{16}.
4. Press the red ENTER key to activate Mode 2.
5. Key in the IA — and TA if necessary.
6. Reset the keyboard.

The IA should now be located in the results memory and may be viewed, in line hexadecimal, by displaying the first location of the RM in the PLAY mode.

5.5.3 *Program Flow Diagram*




1
SET RESULTS MEMORY TO PAGE 1.
RETEST LOCATION FOR GA. JUMP IF ≠.
REVERSE VIDEO OFF. JUMP TO POLL.
2
REVERSE VIDEO OFF. SEND SYNC CHARS. START CCC CALCULATION.
SEND IA-TA FROM RESULTS MEMORY.
ADD CONTROL CHARACTERS.
SEND CHARACTER FROM RESULTS MEMORY.
TEST NEXT CHAR. FOR EOM-I. JUMP IF ≠.
= EOM-I
SEND EOM-I, CCC, IDLE.
NOT EOM-I
TEST NEXT CHAR. FOR EOM-C. JUMP IF ≠.
= EOM-C
SEND EOM-C, CCC, IDLE.
NOT EOM-C
TEST NEXT CHAR. FOR EOM-PB. JUMP IF ≠.
NOT EOM-PB
= EOM-PB
SEND ACTION KEY AND EOM-PB.
ADVANCE RESULTS MEMORY POINTER 2 STEPS. JUMP AND TEST FOR GA.


START
EMULATE TERMINAL
3
ENTER SYNC CHARS, 3F, 3E.
TRAP CPU POLL.
USER ENTERS IA.
START CTR.
CONTROL MODEM. SEND IA 37 (0F, 37; NO BUSINESS RESPONSE).
TRAP CPU POLL.
USER ENTERS IA.
STOP CTR.
CONTROL MODEM. SEND IA 37 (0F, 37; NO BUSINESS RESPONSE).

5.5.4 *Program*

INTERSHAKE II PROGRAM

TITLE: EMULATE CPU OR TERMINAL

FILE NO. D05
SHEET 1 OF 4

DESCRIPTION. This factory-stored test has two parts, Emulate CPU (or central system) and Emulate Terminal. Placing 00 in the bit switches before the program is executed selects Emulate CPU; 01 selects Emulate Terminal.

PROGRAM LOCATION
DTM S/N
CELL C-D
RAM
PROM

OBJECTIVE: Enable the user to test an IPARS terminal by echoing screen back to TA; also to reply to a system poll with a No Business response and make response-time measurements.

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C 8 4 0	0	0	80	[illegible]	Preset Jump to Emulate Terminal program.	
	1	1	01	06	Jump if bit switches = 01.	
	2	2	68	91	Sync, 6 bit, no parity.	
	3	3	00	90	Enter sync mode.	
	4	4	00	57	Enter fill character.	
	5	5	02	98		
	6	6	02	98		
	7	7	02	98	Reserved for reset command if needed.	
	8	8	02	98		
	9	9	02	98		
	A	10	05	82	Delay 500 msec.	
	B	11	01	49	Set results memory to page 1.	
	C	12	3F	50	Send Sync 1.	
	D	13	3E	50	Send Sync 2.	
	E	14	25	58	Start CCC calculation.	
	F	15	0F	50	Send GA.	
D 9 5 1	0	16	00	49	Set results memory to 00. Get IA.	
	1	17	00	52	Send IA from results memory.	
	2	18	1D	50	Send EOM-C.	
	3	19	00	59	Send CCC.	
	4	20	00	50	Send idle character 00.	
	5	21	02	98	No-op.	
	6	22	02	98	No-op.	
	7	23	02	98	No-op.	
	8	24	05	84	Set time-out interrupt.	
	9	25	0C	97	Enable interrupt.	
	A	26	01	49	Set results memory to page 1.	
	B	27	51	94	Turn on reverse video.	
	C	28	0F	25	Record till GA.	
	D	29	08	97	Disable interrupt.	
	E	30	01	49	Reset results memory to page 1, step 0.	
	F	31	2A	41	Preset Jump if valid data block.	

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

CODE: IPARS
SPEED: Any
ASYNC / SYNC
SYN CHARACTER: 3F 3E
STOP BIT: ~~1.0 , 1.5 , 2.0~~
INFO BITS: 5 , 6 , 7 , 8
PARITY: NONE , ODD , EVEN
~~CONTROL EIA / OFF~~
ON-LINE: ~~TD/RD , TD , RD~~
OFF-LINE: TERM / MODEM
MON SIGS: NORMAL
PATCH CORDS: None
CONTROL EIA (V. 24)
COUNTER ZONE
INTERRUPTS: Time-out
FLAGS: Memory overflow
LATCH

CONTINUE ON OTHER SIDE

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CONTINUE ON OTHER SIDE

ADDRESS PAGE (CIRCLE ONE) 3 2 1 (0)		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
E A 6 (2)	0	32	0F	29	Test 1st position of page 1 for GA.	
	1	33	50	94	Turn off reverse video.	
	2	34	01	49	Reset results memory for next response.	
	3	35	00	07	Load results memory with 00s.	
	4	36	23	41	Preset Jump until memory full.	
	5	37	82	47	Jump until memory overflows.	
	6	38	02	98	No-op	
	7	39	0A	40	Jump to repoll terminal.	
	8	40	00	00	Halt	
	9	41	00	00	Halt	
	A	42	01	49	Set results memory to page 1.	
	B	43	30	41	Load address register.	
	C	44	0F	29	Test for ≠ GA.	
	D	45	50	94	Turn off reverse video.	
	E	46	0A	40	Jump and poll if GA.	
	F	47	00	00	Halt	
F B 7 (3)	0	48	C	94	Turn off reverse video.	
	1	49	3F	50	Send Sync 1.	
	2	50	3E	50	Send Sync 2.	
	3	51	25	58	Start CCC calculation.	
	4	52	00	52	Send TA from results memory.	
	5	53	00	52	Send TA from results memory.	
	6	54	10	50	Send No-op command.	
	7	55	0C	50	Send new line command.	
	8	56	00	52	Send data (text) until EOM.	
	9	57	3D	41	Preset Jump to test EOM-C.	
	A	58	0D	29	Test and jump if ≠ EOM-I.	
	B	59	47	40	Jump to send block ending (found EOM-I).	
	C	60	00	00	Halt	
	D	61	42	41	Preset Jump to test EOM-U.	
	E	62	1D	29	Test and jump if ≠ EOM-C (found EOM-C).	
	F	63	4C	40	Jump to send block ending.	

FILE NO. D05
SHEET 1 OF 1
PROGRAM LOCATION
DTM S/N
CELL C-D
RAM
PROM

ADDITIONAL INFORMATION (WRITE IN)

ADDITIONAL REMARKS

PROGRAM WRITTEN BY: DATE

COMPANY NAME: TEL. NO.

ADDRESS:

INTERSHAKE II PROGRAM

TITLE:

DESCRIPTION:

OBJECTIVE:

FILE NO DCS
SHEET 2 OF 4
PROGRAM LOCATION
DTM S/N
CELL C-D
RAM
PROM

ADDRESS PAGE (CIRCLE ONE) 3 2 (1) 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C 8 (4) 0	0	0	00	00	Halt	
	1	1	00	00	Halt	
	2	2	38	41	Preset jump if character not EOM.	
	3	3	3D	29	Test and jump if ≠ EOM-PB.	
	4	4	51	40	Jump to send end of block.	
	5	5	00	00	Halt.	
	6	6	00	00	Halt.	
	7	7	0D	50	Send EOM-1.	
	8	8	00	59	Send new CCC.	
	9	9	00	50	Send idle character 00.	
	A	10	65	40	Jump and test for abutting block.	
	B	11	00	00	Halt.	
	C	12	1D	50	Send EOM-C.	
	D	13	00	59	Send new CCC.	
	E	14	65	40	Jump and test for abutting block.	
	F	15	00	00	Halt.	
D 9 (5) 1	0	16	00	00	Halt.	
	1	17	31	50	Send A.	
	2	18	33	50	Send c.	
	3	19	13	50	Send t.	
	4	20	39	50	Send i.	
	5	21	26	50	Send o.	
	6	22	25	50	Send n.	Send Action code.
	7	23	1C	50	Send space.	
	8	24	33	50	Send c.	
	9	25	26	50	Send o.	
	A	26	34	50	Send d.	
	B	27	35	50	Send e.	
	C	28	1C	50	Send space.	
	D	29	1C	50	Send space.	
	E	30	1C	50	Send space.	
	F	31	1C	50	Send space.	

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

CODE

SPEED

ASYNC / SYNC

SYN CHARACTER

STOP BIT 1.0 , 1.5 , 2.0

INFO BITS 5 , 6 , 7 , 8

PARITY NONE , ODD , EVEN

CONTROL EIA / OFF

ON-LINE TD/RD , TD , RD

OFF-LINE TERM / MODEM

MON SIGS / NORMAL

PATCH CORDS

CONTROL EIA (V. 24)

COUNTER ZONE

INTERRUPTS

FLAGS

LATCH

CONTINUE ON OTHER SIDE

CONTINUE ON OTHER SIDE

ADDRESS PAGE (CIRCLE ONE) 3 2 (1) 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
E A (6) 2	0	32	1D	50	Send EOM-C.	
	1	33	00	59	Send new CCC.	
	2	34	00	50	Send idle.	
	3	35	00	50	Send idle.	
	4	36	02	98	No-op.	
	5	37	00	24	Advance results memory pointer 1 step.	
	6	38	00	24	Advance results memory pointer 1 step.	
	7	39	02	98	No-op.	
	8	40	02	98	No-op.	
	9	41	2B	40	Jump and test for GA (GA = end data).	
	A	42				
	B	43				
	C	44				
	D	45				
	E	46				
	F	47				
F B (7) 3	0	48				
	1	49				
	2	50				
	3	51				
	4	52				
	5	53				
	6	54				
	7	55				
	8	56				
	9	57				
	A	58				
	B	59				
	C	60				
	D	61				
	E	62				
	F	63				

FILE NO. 005
SHEET 2B OF 4
PROGRAM LOCATION
DTM S/N
CELL C-D
RAM
PROM

ADDITIONAL INFORMATION (WRITE IN)

ADDITIONAL REMARKS

PROGRAM WRITTEN BY: DATE

COMPANY NAME: TEL. NO.

ADDRESS:

FORM NO. TP-139-6-77

INTERSHAKE II PROGRAM

TITLE: EMULATE CPU OR TERMINAL

FILE NO. D05
SHEET 3 OF 4

DESCRIPTION: This portion of the program cell emulates a terminal responding to a system poll. The frequency of polls sent to the terminal is measured.

PROGRAM LOCATION
DTM S/N
CELL C-D
RAM
PROM

OBJECTIVE: User must enter the terminal address with Trap Function 22 at program addresses 85 and 97.

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C (8) 4 0	0	0	08	91	Auto panel: one sync character.	
	1	1	3E	90	Enter sync character.	
	2	2	02	98	No-op.	
	3	3	51	94	Turn on reverse video.	
	4	4	0F	21	Trap GA.	
	5	5	00	22	Trap IA. Must be entered by user.	
	6	6	1D	23	Trap EOM-C.	
	7	7	01	14	Wait one character (CCC).	
	8	8	01	87	Start counter for response measurement.	
	9	9	50	94	Turn reverse video off.	
	A	10	80	70	Turn on RTS (emulate multipoint terminal).	
	B	11	40	72	Wait for CTS from modem.	
	C	12	02	98	No-op.	
	D	13	3F	50	Send Sync 1.	
	E	14	3E	50	Send Sync 2.	
	F	15	0F	50	Send GA.	
D (9) 5 1	0	16	37	50	Send character.	
	1	17	00	50	Send idle character.	
	2	18	00	50	Send idle character.	
	3	19	80	71	Turn off RTS.	
	4	20	02	98	No-op.	
	5	21	51	94	Turn on Reverse video.	
	6	22	0F	21	Trap GA.	
	7	23	00	22	Trap IA. Must be entered by user.	
	8	24	1D	23	Trap EOM-C.	
	9	25	01	14	Wait one character (CCC).	
	A	26	02	87	Stop counter.	
	B	27	50	94	Turn off reverse video.	
	C	28	80	70	Turn on RTS.	
	D	29	40	72	Wait for CTS from modem.	
	E	30	3F	50	Send Sync 1.	
	F	31	3E	50	Send Sync 2.	

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

CODE: IPARS
SPEED: Ext. clock
ASYNC / (SYNC)
SYN CHARACTER: 3F 3E
STOP BIT: ~~1.0~~ , ~~1.5~~ , ~~2.0~~
INFO BITS: 5 (6) 7 , 8
PARITY: (NONE) ODD , EVEN
~~CONTROL EIA / OFF~~
ON-LINE: ~~ID/RD , TD , RD~~
OFF-LINE: TERM (MODEM)
MON SIGS / (NORMAL)
PATCH CORDS: None
CONTROL EIA (V. 24): RTS - 0ff7x; DTR - on; CTS - Thru
COUNTER ZONE: Second
INTERRUPTS: None
FLAGS: None
LATCH: None

CONTINUE ON OTHER SIDE

CONTINUE ON OTHER SIDE

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP
E A 6 2	0	32	0F	50	Send GA.	
	1	33	37	50	Send G.	
	2	34	00	50	Send idle character.	
	3	35	00	50	Send idle character.	
	4	36	80	71	Turn off RTS.	
	5	37	80	40	Jump and retest.	
	6	38				
	7	39				
	8	40				
	9	41				
	A	42				
	B	43				
	C	44				
	D	45				
	E	46				
	F	47				
F B 7 3	0	48				
	1	49				
	2	50				
	3	51				
	4	52				
	5	53				
	6	54				
	7	55				
	8	56				
	9	57				
	A	58				
	B	59				
	C	60				
	D	61				
	E	62				
	F	63				

FILE NO.
SHEET 2 OF 4
PROGRAM LOCATION
DTM S/N
CELL
RAM
PROM
ADDITIONAL INFORMATION WRITTEN

ADDITIONAL REMARKS

PROGRAM WRITTEN BY: DATE

COMPANY NAME: TEL. NO.

ADDRESS:

FORM NO. TP-139-6/77

INTERSHAKE II PROGRAM

TITLE:

FILE NO. DD5
SHEET 4 OF 4

DESCRIPTION:

PROGRAM LOCATION
DTM S/N
CELL C-D
RAM
PROM

OBJECTIVE:

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C 8 4 0	0	0				
	1	1				
	2	2				
	3	3				
	4	4				
	5	5				
	6	6				
	7	7				
	8	8				
	9	9				
	A	10				
	B	11				
	C	12				
	D	13				
	E	14				
	F	15				
D 9 5 1	0	16				
	1	17				
	2	18				
	3	19				
	4	20				
	5	21				
	6	22				
	7	23				
	8	24				
	9	25				
	A	26				
	B	27				
	C	28				
	D	29				
	E	30				
	F	31				

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

- CODE
- SPEED
- ASYNC / SYNC
- SYN CHARACTER
- STOP BIT 1.0 , 1.5 , 2.0
- INFO BITS 5 , 6 , 7 , 8
- PARITY NONE , ODD , EVEN
- CONTROL EIA / OFF
- ON-LINE TD/RD , TD , RD
- OFF-LINE TERM / MODEM
- MON SIGS / NORMAL
- PATCH CORDS
- CONTROL EIA (V. 24)
- COUNTER ZONE
- INTERRUPTS
- FLAGS
- LATCH

CONTINUE ON OTHER SIDE

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CONTINUE ON OTHER SIDE

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNC-TION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
E A 6 2	0	32				
	1	33				
	2	34				
	3	35				
	4	36				
	5	37				
	6	38				
	7	39				
	8	40				
	9	41				
	A	42				
	B	43				
	C	44				
	D	45				
	E	46				
	F	47				
F 8 7 3	0	48				
	1	49				
	2	50				
	3	51				
	4	52				
	5	53				
	6	54				
	7	55				
	8	56				
	9	57				
	A	58				
	B	59				
	C	60				
	D	61	0A	97	Disable interrupt.	
	E	62	50	94	Turn reverse video off.	
	F	63	0A	20	Go to address 0A.	

FILE NO. D05
SHEET 4 OF 4
PROGRAM LOCATION
DTM S/N
CELL C-D
RAM
PROM
ADDITIONAL INFORMATION (WRITE IN)

ADDITIONAL REMARKS

PROGRAM WRITTEN BY: John A. Mansker DATE
COMPANY NAME: TEL. NO.
ADDRESS

FORM NO. TP-139-6-77

5.5.5 *Inter-KEY Program Listing as Viewed by Editor (IPARS hexadecimal)*

```
Cg
8041 PRE  0000 HLT  6991 AUT  0000 HLT
0106 JSW  0000 HLT  1F90 SYN  0000 HLT
6891 AUT  3841 PRE  0298 nop  0000 HLT
0090 SYN  2F29 JEM  5194 AUX  0000 HLT
0057 xmt  5140 JMP  3C21 TRP  0000 HLT
0298 nop  0000 HLT  0022 TRP  0000 HLT
0298 nop  0000 HLT  2E23 TRP  0000 HLT
0298 nop  2C50 XMT  0114 REC  0000 HLT

0298 nop  0059 BCC  0187 CTR  0000 HLT
0298 nop  0050 XMT  5094 AUX  0000 HLT
0582 DLY  6540 JMP  8070 232  0000 HLT
0149 -RM  0000 HLT  4072 232  0000 HLT
3F50 XMT  2E50 XMT  0298 nop  0000 HLT
1F50 XMT  0059 BCC  3F50 XMT  0000 HLT
2558 BCC  6540 JMP  1F50 XMT  0000 HLT
3C50 XMT  0000 HLT  3C50 XMT  0000 HLT

0049 -RM  0000 HLT  3B50 XMT  0000 HLT
0052 XMT  2350 XMT  0050 XMT  0000 HLT
2E50 XMT  3350 XMT  0050 XMT  0000 HLT
0059 BCC  3250 XMT  8071 232  0000 HLT
0050 XMT  2750 XMT  0298 nop  0000 HLT
0298 nop  1950 XMT  5194 AUX  0000 HLT
0298 nop  2950 XMT  3C21 TRP  0000 HLT
0298 nop  0E50 XMT  0022 TRP  0000 HLT

0584 INT  3350 XMT  2E23 TRP  0000 HLT
0C97 INT  1950 XMT  0114 REC  0000 HLT
0149 -RM  0B50 XMT  0287 CTR  0000 HLT
5194 AUX  2B50 XMT  5094 AUX  0000 HLT
3C25 REC  0E50 XMT  8070 232  0000 HLT
0897 INT  0E50 XMT  4072 232  0000 HLT
0149 -RM  0E50 XMT  3F50 XMT  0000 HLT
2A41 PRE  0E50 XMT  1F50 XMT  0000 HLT

3C29 JEM  2E50 XMT  3C50 XMT  0000 HLT
5094 AUX  0059 BCC  3B50 XMT  0000 HLT
0149 -RM  0050 XMT  0050 XMT  0000 HLT
0007 BSW  0050 XMT  0050 XMT  0000 HLT
2341 PRE  0298 nop  8071 232  0000 HLT
8247 JFG  0024 -RM  8040 JMP  0000 HLT
0298 nop  0024 -RM  0000 HLT  0000 HLT
0A40 JMP  0298 nop  0000 HLT  0000 HLT

0000 HLT  0298 nop  0000 HLT  0000 HLT
0000 HLT  2B40 JMP  0000 HLT  0000 HLT
0149 -RM  0000 HLT  0000 HLT  0000 HLT
3041 PRE  0000 HLT  0000 HLT  0000 HLT
3C29 JEM  0000 HLT  0000 HLT  0000 HLT
5094 AUX  0000 HLT  0000 HLT  0000 HLT
0A40 JMP  0000 HLT  0000 HLT  0000 HLT
0000 HLT  0000 HLT  0000 HLT  0000 HLT

5094 AUX  0000 HLT  0000 HLT  0000 HLT
3F50 XMT  0000 HLT  0000 HLT  0000 HLT
1F50 XMT  0000 HLT  0000 HLT  0000 HLT
2558 BCC  0000 HLT  0000 HLT  0000 HLT
0052 XMT  0000 HLT  0000 HLT  0000 HLT
0052 XMT  0000 HLT  0000 HLT  0000 HLT
0250 XMT  0000 HLT  0000 HLT  0000 HLT
0C50 XMT  0000 HLT  0000 HLT  0000 HLT

0052 XMT  0000 HLT  0000 HLT  0000 HLT
3B41 PRE  0000 HLT  0000 HLT  0000 HLT
2C29 JEM  0000 HLT  0000 HLT  0000 HLT
4740 JMP  0000 HLT  0000 HLT  0000 HLT
0000 HLT  0000 HLT  0000 HLT  0000 HLT
4241 PRE  0000 HLT  0000 HLT  0897 INT
2E29 JEM  0000 HLT  0000 HLT  5094 AUX
4C40 JMP  0000 HLT  0000 HLT  0A40 JMP
sa
```

5.5.6 *Inter-KEY Program Listing as Loaded from E and F PROMs (line hexadecimal)*

```
Cg
8041 PRE  0000 HLT  6991 AUT  0000 HLT
0106 JSW  0000 HLT  3E90 SYN  0000 HLT
6891 AUT  3841 PRE  0298 nop  0000 HLT
0090 SYN  3B29 JEM  5194 AUX  0000 HLT
0057 xmt  5140 JMP  0F21 TRP  0000 HLT
0298 nop  0000 HLT  0022 TRP  0000 HLT
0298 nop  0000 HLT  1D23 TRP  0000 HLT
0298 nop  0D50 XMT  0114 REC  0000 HLT

0298 nop  0059 BCC  0187 CTR  0000 HLT
0298 nop  0050 XMT  5094 AUX  0000 HLT
0582 DLY  6540 JMP  8070 232  0000 HLT
0149 -RM  0000 HLT  4072 232  0000 HLT
3F50 XMT  1D50 XMT  0298 nop  0000 HLT
3E50 XMT  0059 BCC  3F50 XMT  0000 HLT
2558 BCC  6540 JMP  3E50 XMT  0000 HLT
0F50 XMT  0000 HLT  0F50 XMT  0000 HLT

0049 -RM  0000 HLT  3750 XMT  0000 HLT
0052 XMT  3150 XMT  0050 XMT  0000 HLT
1B50 XMT  3350 XMT  0050 XMT  0000 HLT
0059 BCC  1350 XMT  8071 232  0000 HLT
0050 XMT  3950 XMT  0298 nop  0000 HLT
0298 nop  2650 XMT  5194 AUX  0000 HLT
0298 nop  2550 XMT  0F21 TRP  0000 HLT
0298 nop  1C50 XMT  0022 TRP  0000 HLT

0584 INT  3350 XMT  1D23 TRP  0000 HLT
0C97 INT  2650 XMT  0114 REC  0000 HLT
0149 -RM  3450 XMT  0287 CTR  0000 HLT
5194 AUX  3550 XMT  5094 AUX  0000 HLT
0F25 REC  1C50 XMT  8070 232  0000 HLT
0897 INT  1C50 XMT  4072 232  0000 HLT
0149 -RM  1C50 XMT  3F50 XMT  0000 HLT
2A41 PRE  1C50 XMT  3E50 XMT  0000 HLT

0F29 JEM  1D50 XMT  0F50 XMT  0000 HLT
5094 AUX  0059 BCC  3750 XMT  0000 HLT
0149 -RM  0050 XMT  0050 XMT  0000 HLT
0007 BSW  0050 XMT  0050 XMT  0000 HLT
2341 PRE  0298 nop  8071 232  0000 HLT
8247 JFG  0024 -RM  8040 JMP  0000 HLT
0298 nop  0024 -RM  0000 HLT  0000 HLT
0A40 JMP  0298 nop  0000 HLT  0000 HLT

0000 HLT  0298 nop  0000 HLT  0000 HLT
0000 HLT  2B40 JMP  0000 HLT  0000 HLT
0149 -RM  0000 HLT  0000 HLT  0000 HLT
3041 PRE  0000 HLT  0000 HLT  0000 HLT
0F29 JEM  0000 HLT  0000 HLT  0000 HLT
5094 AUX  0000 HLT  0000 HLT  0000 HLT
0A40 JMP  0000 HLT  0000 HLT  0000 HLT
0000 HLT  0000 HLT  0000 HLT  0000 HLT

5094 AUX  0000 HLT  0000 HLT  0000 HLT
3F50 XMT  0000 HLT  0000 HLT  0000 HLT
3E50 XMT  0000 HLT  0000 HLT  0000 HLT
2558 BCC  0000 HLT  0000 HLT  0000 HLT
0052 XMT  0000 HLT  0000 HLT  0000 HLT
0052 XMT  0000 HLT  0000 HLT  0000 HLT
1050 XMT  0000 HLT  0000 HLT  0000 HLT
0C50 XMT  0000 HLT  0000 HLT  0000 HLT

0052 XMT  0000 HLT  0000 HLT  0000 HLT
3B41 PRE  0000 HLT  0000 HLT  0000 HLT
0B29 JEM  0000 HLT  0000 HLT  0000 HLT
4740 JMP  0000 HLT  0000 HLT  0000 HLT
0000 HLT  0000 HLT  0000 HLT  0000 HLT
4241 PRE  0000 HLT  0000 HLT  0897 INT
1B29 JEM  0000 HLT  0000 HLT  5094 AUX
4C40 JMP  0000 HLT  0000 HLT  0A40 JMP
sk
```

5.6 INTERSHAKE Self-Test (Cell E-F)

5.6.1 Panel Setup

Set up the INTERSHAKE and INTERVIEW panels as follows:

Panel Zone	*Setting or Patch*
5	All RS-232 switches OFF (7X)
3	CONTROL EIA switch OFF
8	Bit switches to SPACE (off)
2	Patch CONTROL OUT to MONITOR IN
2.5	Patch DETECT IN to RTS input
5	Patch Pin 24 to Pin 17
—	Loop modem connector to terminal connector with 25-pin cable.
6	Set COUNTER input switch to EVENTS (8X)
—	All other DTM-2 panel switches: Don't care
INTERVIEW	Set PAGE to 1 and 2
INTERVIEW	Set CODE to ASCII
4	Depress RUN button
3	Press MARK and SPACE buttons; and then START

5.6.2 Test Operation

Proper operation of the self-test starts with a 0.5-second audible alarm test and display of the message RUNNING on the CRT after the screen is cleared. The cursor is located at the end of the message.

While the results memory is being tested, the CRT is frozen. The freeze is removed when the loopback synchronization test starts. A specific sequence of characters is transmitted (and displayed in normal half-intensity video), The same block is checked for both sequence order and CCC. Specific characters of the block are simultaneously recorded into results memory along with loop count, RS-232 lead status, and counter reading (15). After a successful sequence and CCC test, the recorded data is read from results memory to the CRT for visual observation. (See Figure 5.1.)

After proper completion of both the results memory test and the loopback-sequence-CCC test, a Function 0098 recycle test is executed. This restarts the test, which is marked by a second 0.5-second Beep from the audible alarm. However, Flag 1 should now be set, causing the program to turn Page 1 off, Page 2 on, and send four stored messages in ASCII, IPARS, EBCDIC, and EBCD, respectively. Upon completion of the stored messages, an END-TEST message in blinking reverse video appears on the CRT and the program ends in a Function 99. (See Figure 5.1.)

At the end of the loopback test the RS-232 leads are tested for the conditions ON, OFF, Jump if ON, Jump if OFF, Wait until ON, Wait until OFF, Interrupt if ON and Interrupt if OFF. The leads are switched from modem to terminal mode via auto paneling. This takes advantage of the proper housekeeping done on the INTERSHAKE EIA connectors. The patch from CONTROL OUT to MONITOR IN will test the status of the CONTROL OUT test point as well as operation of the hit indicator, if it is reset before the test is started.

Table 5.1

CRT Display	*Program Step*	*Halt or Function*	*Cause*
FF Failed	OC	0000	Bit switches are other than 00.
ET Failed	84	9617	Unable to detect sync. Defective delay line or transmitted data.
D2 Failed	12	0200	Flat 0 = 1 should be off.
ASCII fox messages displayed with END-TEST	—	0099	Only Page 2 displayed, not Page 1. Correct display ends with Pages 1 and 2 displayed; manually controllable.
9 Failed	39	0400	Results memory not all 00.
: Failed	3A	0500	Results memory not all FF.
J Failed	4A	0600	Log latch or parity failure.
BS Failed	88	4220	Trap failed or was not satisfied.
LF Failed	8A	C321	Trap sequence failed.
D4 Failed	94	0800	Failure of Jump if equal.
X Failed	F8	1300	—
EB Failed	97	C925	Trap failed.
(Failed	A8	0272	Detect in for on failed (no RTS)
- Failed	AD	0273	Detect in for off failed.
+ Failed	AB	0C00	Failure of Jump if DTR on.
" Failed	A7	0900	Failure of Jump if data greater than CTR.

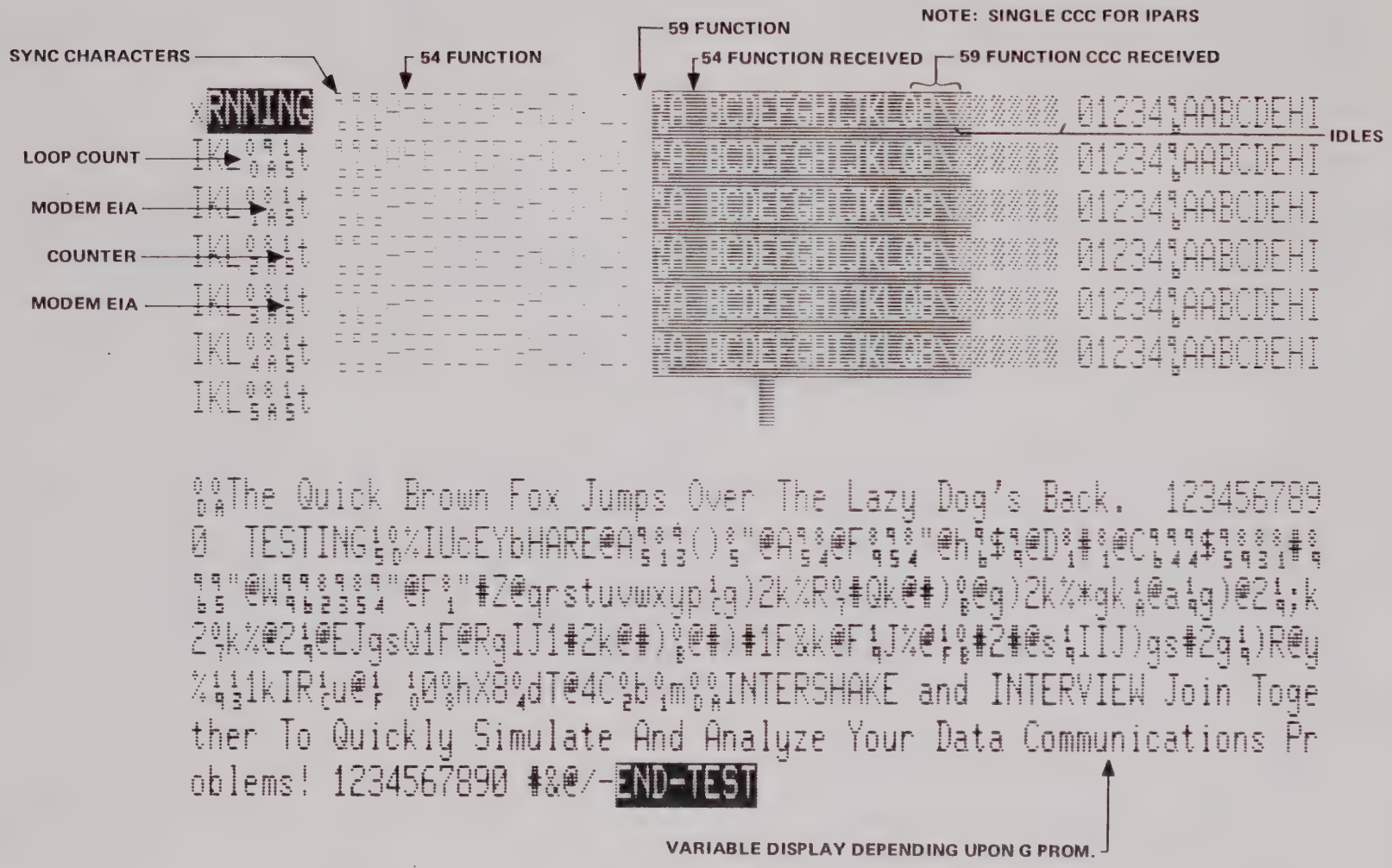


FIG. 5.1 INTERVIEW Screen, Self-Test.

5.6.3 Identification of Errors

The Self-Test has been developed to help the user determine where a failure has occurred. It also indicates when the test is running and has completed.

If the test fails to complete properly, the point at which failure has occurred may be indicated by a message "(char) FAILED" on the CRT. The ASCII hexadecimal equivalent of the character in the FAILED message is the program step that failed.

The test should complete in no more than 20 seconds, but a failure may cause it to halt and hang in error condition indefinitely.

Table 5.1 lists some error indications and their possible causes.

5.6.4 INTERSHAKE Self-Test Function List

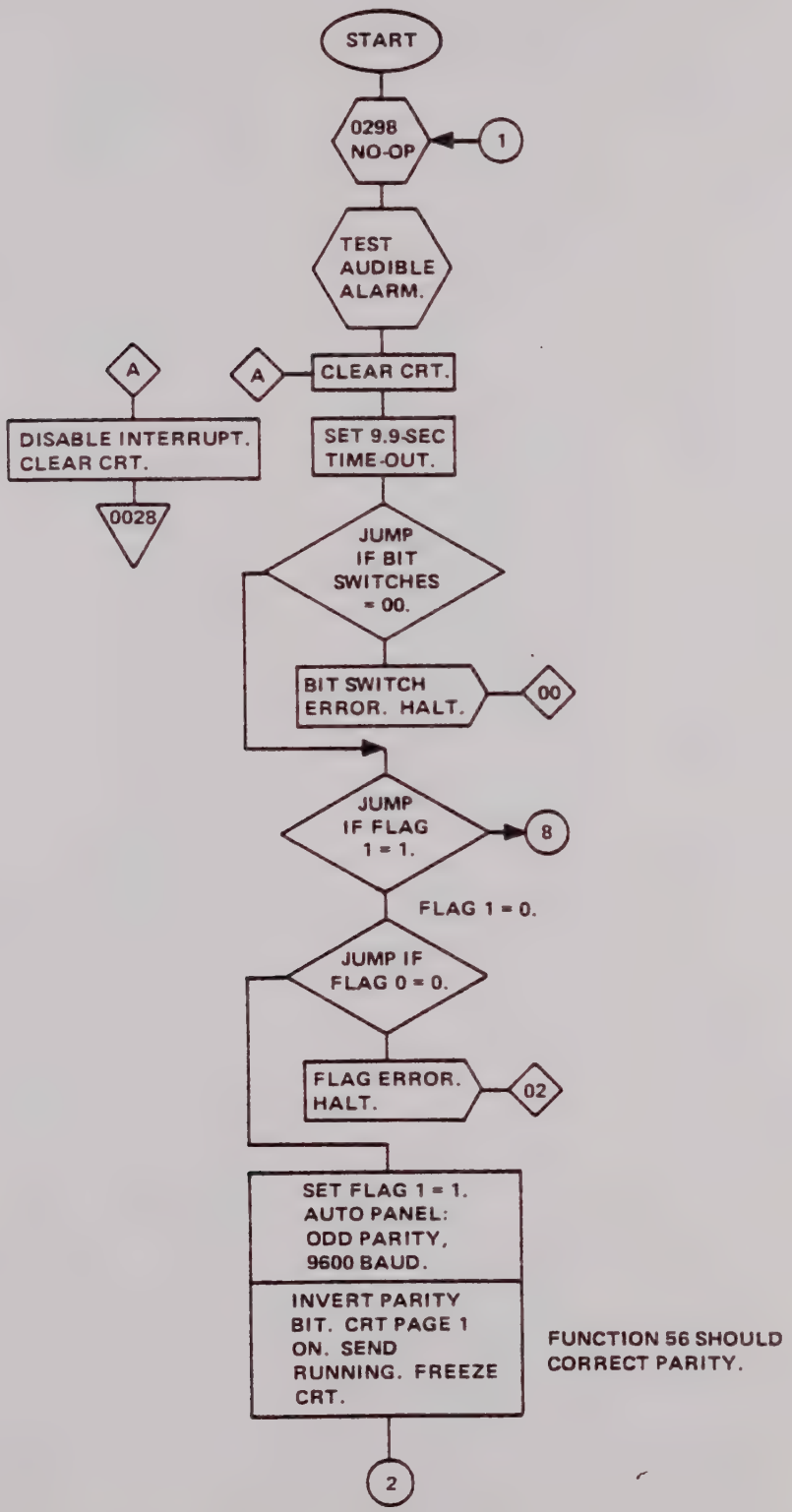
Seventy-four out of the 97 INTERSHAKE II functions appear in the program. They are listed here with comments on their use in this test.

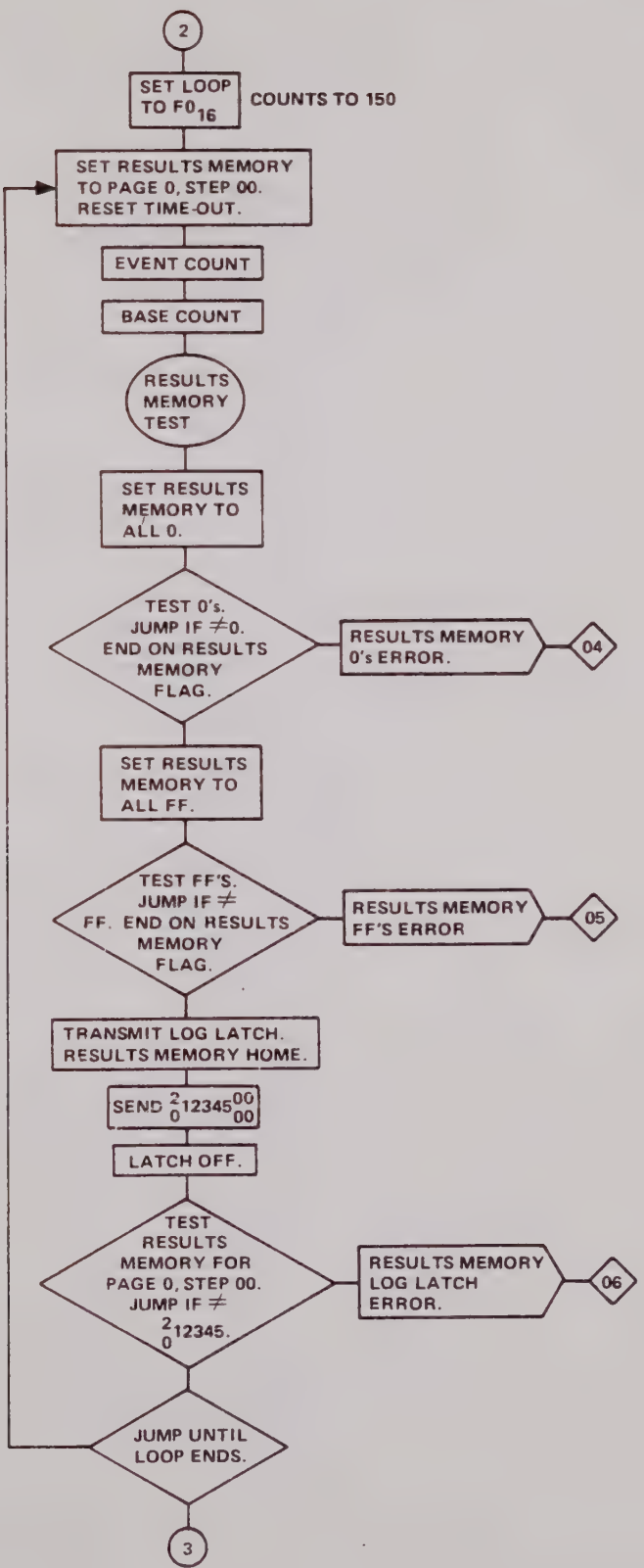
No.	*Description*	*Self-Test Use*
00	Halt	Error halts. Identified by number in the data.
06	Test bit switch and jump	Test bit switches for the *all-off* condition. If any are on, a 00 error halt results.
07	Load results memory	Load results memory with all 00 or all FF. Used as a delimiter for Function 53.
08	Record loop count	Record results memory loop count (150 loops).
09	Record interrupt step	Indicate to user which step has failed. Activated by time-out interrupt.
12	Record RS-232 lead status	Record RS-232 leads for display on CRT.
16	Wait for equal character	Wait for Q character to perform CCC check.
17	Wait for not-equal character	Wait for not-equal synchronization character to start receive-CRC calculation.
20	Trap character	Trap character received from delay line.
21	Trap first character in sequence	Same.
22	Trap characters within sequence	Same.
23	Trap last character in sequence	Same.
24	Increment results memory	Memory set.
25	Record until trap	Record until character from delay line is trapped.
26	Record next not-equal character	Record not-equal character received from delay line.
27	Load address register.	
28	Address register return.	
30	Record next character.	
33	Record character before trap.	
35	Record latch.	Loop unit back on itself (Mon sigs out ON). Record all transmitted data. Record all received data.
36	Record current character.	
37	Force into synchronization.	
38	Start IPARS CCC calculation.	
39	Test CCC.	
40	Unconditional jump	Jump to all subroutines.
41	Preset jump.	
42	Set loop count	Test results memory 150 times. Loop back test, 6 times.
43	End loop.	
44	Jump if equal character.	
45	Jump if not-equal character.	
46	Retest and jump if equal character.	
47	Test flag	Test Flag 1 for ON condition upon restart Test Flag 0 for OFF upon installation. Test memory overflow flag until ON. Test memory overflow flag for ON.
48	Set results memory step	As intended.
49	Set results memory page	As intended.
50	Send character.	
52	Send results memory location.	
53	Send results memory until trap character	Send results memory trapped and recorded data to INTERVIEW for visual test.
54	Send results memory until trap function.	

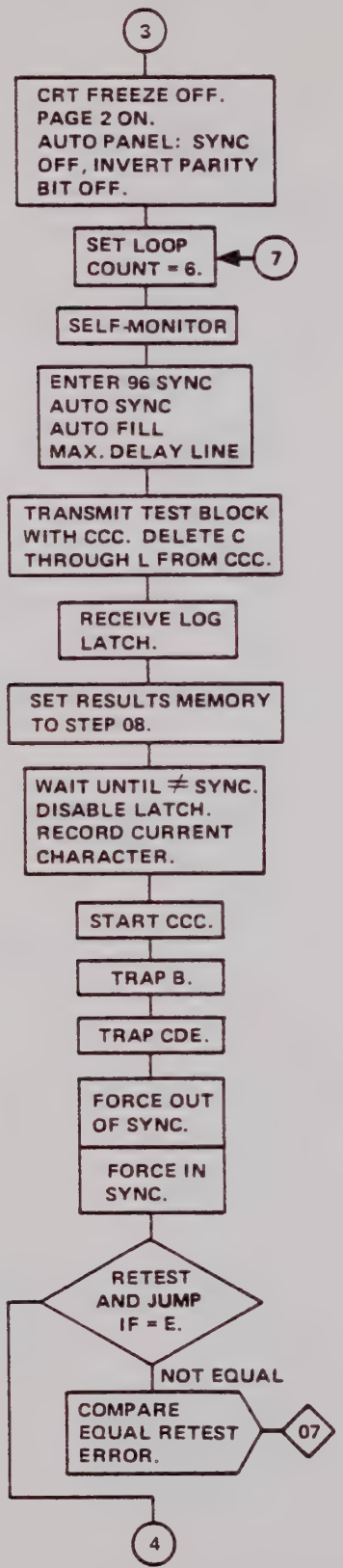
No.	*Description*	*Self-Test Use*
55	Stop and Start CCC	Start and stop calculator, deleting character D from loopback test.
56	Invert parity bit	Latch on and off.
57	Load fill character.	
58	Start CCC calculation.	
59	Send CCC.	
60	Send ASCII Fox message.	
62	Send IPARS message.	
63	Send EBCDIC message.	
65	Send EBCD message.	
70	Turn on RS-232 lead(s)	Visually check all leads, using LEDs.
71	Turn off RS-232 lead(s).	Turn off all leads at end of test.
72	Wait until test point is on	Test ON condition of RTS with INTERSHAKE in toward-modem mode (auto-panel modem).
73	Wait until test point is off	Test OFF condition of RTS with INTERSHAKE in toward-terminal mode (auto-panel terminal).
74	Interrupt if lead is on	Interrupt after RTS is on.
75	Interrupt if lead is off	Interrupt after RTS is off (interrupt lead tested).
76	Cancel Interrupt.	
77	Jump if lead is on	Test lead.
78	Jump if lead is off	Test lead.

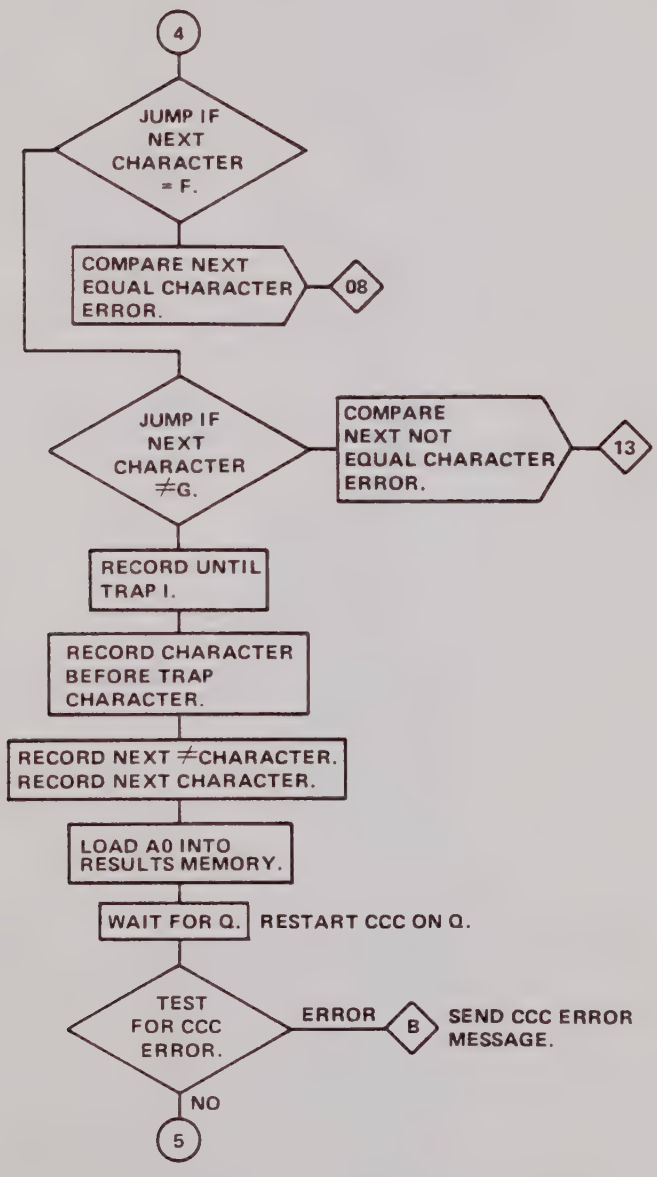
No.	*Description*	*Self-Test Use*
80	Time delay	Time Clear CRT ON.
81	Time delay	Time Clear CRT ON.
82	Time delay	Time audible alarm ON, 0.5 sec.
84	Set time-out interrupt.	
85	Base Count.	
87	Counter control	Count loops in results memory test visually.
88	Jump if counter is greater than data	Test event counter for a value greater than 08. Should be 15.
89	Record loop count	Record 6 loopback counts.
90	Enter synchronization character	Loopback test (synchronization test).
91	Auto panel	Establish synchronous mode.
92	Auto panel speed	Set speed of test to 9600 bps.
93	Auto panel	Switch from modem to terminal testing. RS-232 housekeeping.
94	CRT controls	Test: Page 1, Page 2, Pages 1 and 2. Reverse video Half-intensity Blink Freeze Clear.
95	Auto synchronization	Force out of synchronization.
96	Delay line	Select 4 kbits for loopback test.
97	Interrupt	Time out.
98	Recycle test.	
99	END.	

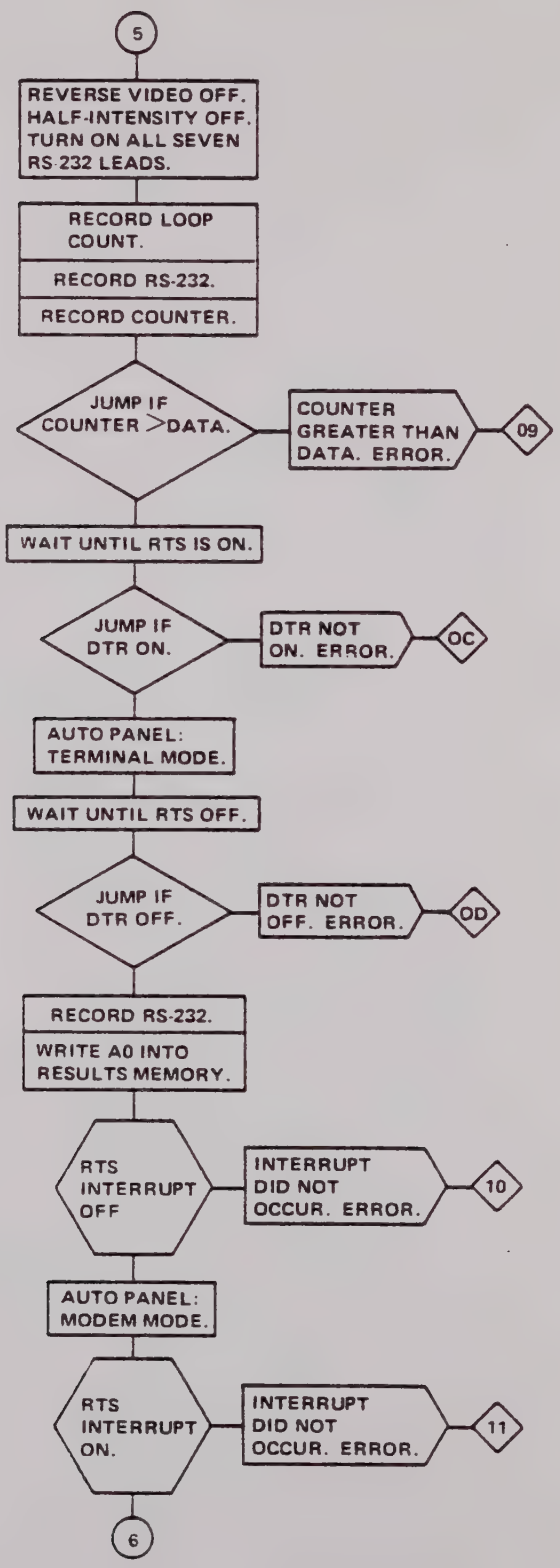
5.6.5 *Program Flow Diagram*

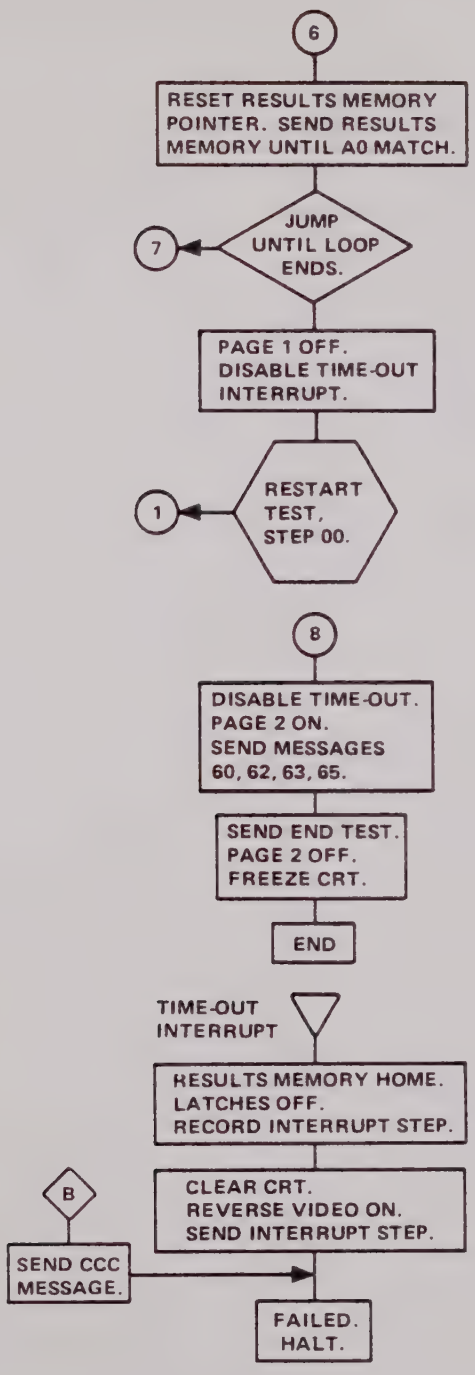



2
SET LOOP TO F0 16
COUNTS TO 150
SET RESULTS MEMORY TO PAGE 0, STEP 00. RESET TIME-OUT.
EVENT COUNT
BASE COUNT
RESULTS MEMORY TEST
SET RESULTS MEMORY TO ALL 0.
TEST 0's. JUMP IF ≠0. END ON RESULTS MEMORY FLAG.
RESULTS MEMORY 0's ERROR.
04
SET RESULTS MEMORY TO ALL FF.
TEST FF'S. JUMP IF ≠ FF. END ON RESULTS MEMORY FLAG.
RESULTS MEMORY FF'S ERROR
05
TRANSMIT LOG LATCH. RESULTS MEMORY HOME.
SEND 2 0 12345 00 00
LATCH OFF.
TEST RESULTS MEMORY FOR PAGE 0, STEP 00. JUMP IF ≠ 2 0 12345.
RESULTS MEMORY LOG LATCH ERROR.
06
JUMP UNTIL LOOP ENDS.
3


3
CRT FREEZE OFF.
PAGE 2 ON.
AUTO PANEL: SYNC OFF, INVERT PARITY BIT OFF.
SET LOOP COUNT = 6.
7
SELF-MONITOR
ENTER 96 SYNC
AUTO SYNC
AUTO FILL
MAX. DELAY LINE
TRANSMIT TEST BLOCK WITH CCC. DELETE C THROUGH L FROM CCC.
RECEIVE LOG LATCH.
SET RESULTS MEMORY TO STEP 08.
WAIT UNTIL ≠ SYNC.
DISABLE LATCH.
RECORD CURRENT CHARACTER.
START CCC.
TRAP B.
TRAP CDE.
FORCE OUT OF SYNC.
FORCE IN SYNC.
RETEST AND JUMP IF = E.
NOT EQUAL
COMPARE EQUAL RETEST ERROR.
07
4


4
JUMP IF NEXT CHARACTER = F.
COMPARE NEXT EQUAL CHARACTER ERROR.
08
JUMP IF NEXT CHARACTER ≠G.
COMPARE NEXT NOT EQUAL CHARACTER ERROR.
13
RECORD UNTIL TRAP I.
RECORD CHARACTER BEFORE TRAP CHARACTER.
RECORD NEXT ≠CHARACTER.
RECORD NEXT CHARACTER.
LOAD A0 INTO RESULTS MEMORY.
WAIT FOR Q.
RESTART CCC ON Q.
TEST FOR CCC ERROR.
ERROR
B
SEND CCC ERROR MESSAGE.
NO
5


5
REVERSE VIDEO OFF. HALF-INTENSITY OFF. TURN ON ALL SEVEN RS-232 LEADS.
RECORD LOOP COUNT.
RECORD RS-232.
RECORD COUNTER.
JUMP IF COUNTER >DATA.
COUNTER GREATER THAN DATA. ERROR.
09
WAIT UNTIL RTS IS ON.
JUMP IF DTR ON.
DTR NOT ON. ERROR.
0C
AUTO PANEL: TERMINAL MODE.
WAIT UNTIL RTS OFF.
JUMP IF DTR OFF.
DTR NOT OFF. ERROR.
0D
RECORD RS-232.
WRITE A0 INTO RESULTS MEMORY.
RTS INTERRUPT OFF
INTERRUPT DID NOT OCCUR. ERROR.
10
AUTO PANEL: MODEM MODE.
RTS INTERRUPT ON.
INTERRUPT DID NOT OCCUR. ERROR.
11
6


6
RESET RESULTS MEMORY POINTER. SEND RESULTS MEMORY UNTIL A0 MATCH.
JUMP UNTIL LOOP ENDS.
7
PAGE 1 OFF. DISABLE TIME-OUT INTERRUPT.
RESTART TEST, STEP 00.
1
8
DISABLE TIME-OUT. PAGE 2 ON. SEND MESSAGES 60, 62, 63, 65.
SEND END TEST. PAGE 2 OFF. FREEZE CRT.
END
TIME-OUT INTERRUPT
RESULTS MEMORY HOME. LATCHES OFF. RECORD INTERRUPT STEP.
CLEAR CRT. REVERSE VIDEO ON. SEND INTERRUPT STEP.
B
SEND CCC MESSAGE.
FAILED. HALT.

5.6.6 *Program*

INTERSHAKE II PROGRAM

TITLE: INTERSHAKE IPARS SELF-TEST

FILE NO. 005 SHEET 1 OF 4

DESCRIPTION: Refer to Sections 5.6.1 - 5.6.4

PROGRAM LOCATION
DTM S/N
CELL E - F
RAM
PROM

OBJECTIVE:

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C 8 4 (0)	0	0	0C	98	Test No-op function.	
	1	1	01	70	Test alarm (alarm on).	
	2	2	05	82	0.5-Second delay Function 82 test.	
	3	3	FF	71	Turn off alarm (turn off all leads).	
	4	4	06	27	Load address register: test Function 27.	
	5	5	EC	40	Go-to.	
	6	6	08	97	Disable interrupt selection group	
	7	7	FF	84	Set maximum delay time-out.	
	8	8	0C	97	Interrupt on time-out.	
	9	9	FF	57	Load idle fill character.	
	A	10	0D	41	Load address register. Jump if bit switches off.	
	B	11	00	03	Test for all bit switches off.	
	C	12	00	00	Halt 00. Bit switch error.	
	D	13	02	41	Load address register.	
	E	14	13	47	Jump if Flag 1 = 1 (Flag is off at start).	
	F	15	12	41	Load address register.	
D 9 5 (1)	0	16	22	47	Jump if Flag 0 = 0 (Flag is off at start).	
	1	17	02	00	Flag 0 error--should have been off.	
	2	18	11	47	Set Flag 1 = 1.	
	3	19	14	91	Auto panel.	
	4	20	01	56	Invert parity bit.	
	5	21	F0	92	Auto panel: 9.6 kbps.	
	6	22	11	94	Select INTERVIEW page 1.	
	7	23	51	94	Turn on reverse video.	
	8	24	02	50	Send R.	Send
	9	25	55	50	Send U.	RUNNING
	A	26	4E	50	Send N.	to
	B	27	CE	50	Send N.	INTERVIEW.
	C	28	C9	50	Send I.	
	D	29	4E	50	Send N.	
	E	30	47	50	Send G.	
	F	31	50	94	Turn off reverse video.	

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

CODE: ASCII
SPEED: 9.6,56 kbps
(ASYNC / SYNC)
SYN CHARACTER: 96
STOP BIT: 1.0 , 1.5 , 2.0
INFO BITS: ~~X~~XX~~X~~XXXX (8)
PARITY: NONE , ODD , EVEN
CONTROL EIA / OFF
ON-LINE: ~~TD/RD , TD , RD~~
OFF-LINE: TERM / MODEM
(MON SIGS) NORMAL
PATCH CORDS: Detect in to KTS 24 to 17 Mon to Sigs out
CONTROL EIA (V.24): ALL 7X positions.
COUNTER ZONE: Events (8X)
INTERRUPTS: RS-232
FLAGS: 0,1
LATCH: 0035

CONTINUE ON OTHER SIDE

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CONTINUE ON OTHER SIDE

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNC-TION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
E A 6 2	0	32	31	94	Freeze CRT.	
	1	33	F0	42	Set loop count to 150.	
	2	34	00	49	Set results memory home.	
	3	35	03	87	Add to event count (test counter).	
	4	36	00	85	Add one to base count.	
	5	37	00	07	Load fill character 00 (All ∅ bits).	
	6	38	25	41	Load address register.	
	7	39	82	47	Load RM with 00 till overflow flag on.	
	8	40	00	49	Set RM home (resets overflow flag).	
	9	41	39	41	Load address register.	
	A	42	00	29	Jump if RM position not = 00.	
	B	43	00	24	Increment RM address pointer one step.	
	C	44	29	41	Load address pointer.	
	D	45	82	47	Test for 00 in RM until overflow.	
	E	46	00	49	Set RM home (Resets overflow flag).	
	F	47	FF	07	Load fill character FF (all one bits).	
F B 7 3	0	48	2F	41	Load address register.	
	1	49	82	47	Load RM with FF till overflow flag on.	
	2	50	00	49	Set RM home (resets overflow flag).	
	3	51	3A	41	Load address register.	
	4	52	FF	29	Jump if RM position not = FF.	
	5	53	00	24	Increment RM address pointer one step.	
	6	54	3B	41	Load address register.	
	7	55	83	47	Jump when overflow flag = 1 = on.	
	8	56	33	40	Go-to.	
	9	57	04	00	Halt 4. Results memory not 00. Error.	
	A	58	05	00	Halt 5. Results memory not FF. Error.	
	B	59	31	94	Freeze CRT.	
	C	60	03	35	Latch record all transmit data.	
	D	61	00	49	Reset results memory home.	
	E	62	20	50	Send space to RM (record).	
	F	63	B0	50	Send 0 to RM (record).	

FILE NO. 005
SHEET 18 OF 4
PROGRAM LOCATION
DTM S/N
CELL E - F
RAM
PROM
ADDITIONAL INFORMATION (WRITE IN)

ADDITIONAL REMARKS

PROGRAM WRITTEN BY: DATE

COMPANY NAME: TEL. NO.

ADDRESS:

INTERSHAKE II PROGRAM

TITLE:

FILE NO. D05
SHEET 2 OF 4

DESCRIPTION:

PROGRAM LOCATION
DTM S/N
CELL
RAM
PROM

OBJECTIVE:

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C 8 4 0	0	0	31	50	Send 1 to RM (record).	
	1	1	32	50	Send 2 to RM (record).	
	2	2	B3	50	Send 3 to RM (record).	
	3	3	34	50	Send 4 to RM (record).	
	4	4	B5	50	Send 5 to RM (record).	
	5	5	20	50	Send space to RM (not recorded).	
	6	6	00	35	Record transmit latch OFF.	
	7	7	00	49	Set results memory home.	
	8	8	4A	41	Load address register.	
	9	9	4B	40	Go-to. Jump around error halt if no error.	
	A	10	06	00	Halt 6. Log latch error.	
	B	11	20	29	Jump if space character not at RM home.	
	C	12	00	24	Increment RM address pointer.	
	D	13	B0	29	Jump if 0 not at RM +1.	
	E	14	00	24	Increment RM address pointer.	
	F	15	31	29	Jump if 1 not at RM +2.	
D 9 5 1	0	16	00	24	Increment RM address pointer.	
	1	17	32	29	Jump if 2 not at RM +3.	
	2	18	00	24	Increment RM address pointer.	
	3	19	B3	29	Jump if 3 not at RM +4.	
	4	20	00	24	Increment RM address pointer.	
	5	21	34	29	Jump if 4 not at RM +5.	
	6	22	00	24	Increment RM address pointer.	
	7	23	B5	29	Jump if 5 not at RM +6.	
	8	24	22	41	Load address register.	
	9	25	00	43	End loop count.	
	A	26	00	56	Set parity bit normal.	
	B	27	54	91	Auto panel.	
	C	28	30	94	CRT freeze off.	
	D	29	21	94	Select INTERVIEW page 2.	
	E	30	00	92	Set speed to 56 kbps.	
	F	31	06	42	Set loop count to 6.	

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

CODE

SPEED

ASYNC / SYNC

SYN CHARACTER

STOP BIT 1.0 , 1.5 , 2.0

INFO BITS 5 , 6 , 7 , 8

PARITY NONE , ODD , EVEN

CONTROL EIA / OFF

ON-LINE TD/RD , TD , RD

OFF-LINE TERM / MODEM

MON SIGS / NORMAL

PATCH CORDS

CONTROL EIA (V. 24)

COUNTER ZONE

INTERRUPTS

FLAGS

LATCH

CONTINUE ON OTHER SIDE

CONTINUE ON OTHER SIDE

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP
E A 6 2	0	32	02	96	Enable delay line.	
	1	33	00	49	Set results memory home.	
	2	34	F7	93	Auto panel.	
	3	35	96	90	Load sync character, even-parity ASCII.	
	4	36	61	94	Turn on half-intensity video.	
	5	37	02	35	Self-monitor.	
	6	38	96	50	Send sync character.	
	7	39	96	50	Send sync character.	
	8	40	96	50	Send sync character.	
	9	41	41	50	Send A.	
	A	42	25	58	Start IPARS CCC calculation.	
	B	43	50	54	Send space with Function 54.	
	C	44	42	50	Send B.	
	D	45	10	55	Stop calculator.	
	E	46	C3	50	Send C.	
	F	47	44	50	Send D.	
F B 7 3	0	48	C5	50	Send E.	
	1	49	C6	50	Send F.	
	2	50	47	50	Send G.	
	3	51	48	50	Send H.	
	4	52	C9	50	Send I.	
	5	53	CA	50	Send J.	
	6	54	4B	50	Send K.	
	7	55	54	91	Auto panel.	
	8	56	CC	50	Send L.	
	9	57	54	91	Auto panel.	
	A	58	D1	50	Send Q.	
	B	59	00	55	Restart CCC calculator.	
	C	60	00	59	Send CCC.	
	D	61	00	15	Wait till Send complete.	
	E	62	00	35	Turn self-monitor latch off.	
	F	63	51	94	Turn on reverse video.	

FILE NO. 005
SHEET 28 OF 4
PROGRAM LOCATION
DTM S/N
CELL E - F
RAM
PROM
ADDITIONAL INFORMATION (WRITE IN)

ADDITIONAL REMARKS

PROGRAM WRITTEN BY: DATE

COMPANY NAME: TEL. NO.

ADDRESS

FORM NO. TP-139-6-77

INTERSHAKE II PROGRAM

TITLE:

FILE NO. D05
SHEET 3 OF 4

DESCRIPTION:

PROGRAM LOCATION
DTM S/N
CELL E - F
RAM
PROM

OBJECTIVE:

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNC-TION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C 8 4 0	0	0	01	35	Record receive data latch on (records A).	
	1	1	00	49	Set results memory home.	
	2	2	06	48	Set RM address pointer to position 6.	
	3	3	F0	92	Set speed back to 9.6 kbps.	
	4	4	96	17	Wait until char ≠ Sync (A from delay line).	
	5	5	00	35	Latch off (0135 records A from delay line).	
	6	6	00	36	Record current character (still A).	
	7	7	25	38	Start receive CCC calculation.	
	8	8	42	20	Trap character B.	
	9	9	10	55	Stop CCC calculator.	
	A	10	C3	21	Trap first character C.	
	B	11	44	22	Trap middle character D.	
	C	12	C5	23	Trap last character E.	
	D	13	18	95	Force out of synchronization.	
	E	14	00	37	Force back in synchronization.	
	F	15	92	41	Load address register.	
D 9 5 1	0	16	C5	46	Retest and jump = E.	
	1	17	07	00	Halt 7. Not E error.	
	2	18	95	41	Load address register.	
	3	19	C6	44	Jump if next character = F.	
	4	20	08	00	Halt 8. Next character was not F.	
	5	21	F8	41	Load address register.	
	6	22	47	45	Jump if char not equal to G.	
	7	23	C9	25	Record until Trap character I (HI).	
	8	24	CA	33	Record character before Trap J (I).	
	9	25	41	26	Record next not equal character (K).	
	A	26	00	30	Record next character (L).	
	B	27	D1	16	Wait for Q.	
	C	28	00	55	Restart CCC calculator.	
	D	29	F2	41	Load address register.	
	E	30	00	39	Test CCC. Jump if error.	
	F	31	50	94	Turn off reverse video.	

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

CODE

SPEED

ASYNC / SYNC

SYN CHARACTER

STOP BIT 1.0 , 1.5 , 2.0

INFO BITS 5 , 6 , 7 , 8

PARITY NONE , ODD , EVEN

CONTROL EIA / OFF

ON-LINE TD/RD , TD , RD

OFF-LINE TERM / MODEM

MON SIGS / NORMAL

PATCH CORDS

CONTROL EIA (V.24)

COUNTER ZONE

INTERRUPTS

FLAGS

LATCH

CONTINUE ON OTHER SIDE

CONTINUE ON OTHER SIDE

ADDRESS PAGE (CIRCLE ONE) 3 (2) 1 0		ENTRY STEP	DATA	FUNC-TION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
E (A) 6 2	0	32	60	94	Turn off half-intensity video.	
	1	33	FE	70	Turn on all leads except alarm.	
	2	34	00	08	Record loop count.	
	3	35	00	12	Record RS-232 lead status.	
	4	36	00	89	Record counter.	
	5	37	A8	41	Load address register.	
	6	38	08	88	Jump if counter is greater than data (150).	
	7	39	09	00	Halt 9. Counter was not greater. Error.	
	8	40	02	72	Wait for RTS ON (should be on).	
	9	41	AC	41	Load address register.	
	A	42	08	77	Jump if DTR on (should be on).	
	B	43	0C	00	Halt 0C. DTR off. Error.	
	C	44	EF	93	Auto panel: terminal mode.	
	D	45	02	73	Wait until RTS off (should be off in terminal mode).	
	E	46	B1	41	Load address register.	
	F	47	08	78	Jump if DTR is off (should be off).	
F (B) 7 3	0	48	0D	00	Halt 0D. DTR error.	
	1	49	00	12	Record status in terminal mode.	
	2	50	A0	07	Load fill character used for Function 53.	
	3	51	80	75	Interrupt if RTS lead is off (should be off).	
	4	52	10	00	Halt 10. RTS error.	
	5	53	00	76	Disable lead interrupt.	
	6	54	F5	93	Auto panel: modem mode.	
	7	55	80	74	Interrupt if RTS is on (modem mode turned on RTS).	
	8	56	11	00	RTS error.	
	9	57	00	76	Disable lead interrupt.	
	A	58	00	49	Set results memory home.	
	B	59	00	52	Send first character for RM home position.	
	C	60	A0	53	Send RM through A0 (space).	
	D	61	61	41	Load address register.	
	E	62	00	43	End loop (count 6).	
	F	63	10	94	Select INTERVIEW page 1.	

FILE NO. 005
SHEET 3B OF 4
PROGRAM LOCATION
DTM S/N
CELL E - F
RAM
PROM

ADDITIONAL INFORMATION (WRITE IN)

ADDITIONAL REMARKS

PROGRAM WRITTEN BY: DATE

COMPANY NAME: TEL. NO.

ADDRESS:

INTERSHAKE II PROGRAM

TITLE:

FILE NO. D05
SHEET 4 OF 4

DESCRIPTION:

PROGRAM LOCATION
DTM S/N
CELL E - F
RAM
PROM

OBJECTIVE:

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C 8 4 0	0	0	08	97	Disable time-out interrupt.	
	1	1	00	98	Recycle test.	
	2	2	08	97	Disable time-out interrupt.	
	3	3	C5	27	Load address register.	
	4	4	EC	40	Go-to.	
	5	5	01	60	Send ASCII fox message from G PROM.	
	6	6	99	83	Wait 99 bit times.	
	7	7	01	63	Send EBCDIC message.	
	8	8	01	65	Send EBCD message.	
	9	9	01	62	Send IPARS message.	
	A	10	71	94	Turn on blinking video.	
	B	11	51	94	Turn on reverse video.	
	C	12	C5	50	Send E.	
	D	13	4E	50	Send N.	
	E	14	44	50	Send D	Send END-TEST message
	F	15	2D	50	Send –.	
D 9 5 1	0	16	D4	50	Send T.	
	1	17	C5	50	Send E.	
	2	18	53	50	Send S.	
	3	19	D4	50	Send T.	
	4	20	20	94	Turn off INTERVIEW page 2.	
	5	21	31	94	Freeze CRT.	
	6	22	02	98	No-op.	
	7	23	00	99	END. Complete light on.	
	8	24	00	49	Set results memory home.	
	9	25	F0	92	Set speed to 9.6 kbps.	
	A	26	00	35	Turn off log latch modes.	
	B	27	00	09	Record interrupted step.	
	C	28	F0	92	Set speed to 9.6 kbps.	
	D	29	E0	27	Load address register.	
	E	30	30	94	Unfreeze CRT.	
	F	31	EC	40	Go-to.	

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

CODE
SPEED
ASYNC / SYNC
SYN CHARACTER
STOP BIT 1.0 , 1.5 , 2.0
INFO BITS 5 , 6 , 7 , 8
PARITY NONE , ODD , EVEN
CONTROL EIA / OFF
ON-LINE TD/RD , TD , RD
OFF-LINE TERM / MODEM
MON SIGS / NORMAL
PATCH CORDS
CONTROL EIA (V. 24)
COUNTER ZONE
INTERRUPTS
FLAGS
LATCH

CONTINUE ON OTHER SIDE

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CONTINUE ON OTHER SIDE

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP
E A 6 2	0	32	00	49	Set results memory home.	
	1	33	51	94	Turn off reverse video.	
	2	34	00	52	Send recorded interrupt step to CRT.	
	3	35	A0	50	Send space.	
	4	36	C6	50	Send F. }	
	5	37	41	50	Send A. }	
	6	38	C9	50	Send I. } Send	
	7	39	CC	50	Send L. } FAILED	
	8	40	C5	50	Send E. } message.	
	9	41	44	50	Send D. }	
	A	42	31	94	Freeze CRT.	
	B	43	12	00	Halt 12.	
	C	44	08	97	Disable time-out interrupt.	
	D	45	02	81	Delay.	
	E	46	01	94	CRT clear ON.	
	F	47	02	80	Delay.	
F B 7 3	0	48	00	94	CRT clear OFF.	
	1	49	00	28	Branch and link. Return.	
	2	50	F4	27	Load address register.	
	3	51	EC	40	Go-to.	
	4	52	C3	50	Send C. } Send CRC	
	5	53	D2	50	Send R. } FAILED	
	6	54	C3	50	Send C. } message.	
	7	55	E3	40	Go-to.	
	8	56	13	00	Halt 13.	
	9	57	E1	E1	End of file.	
	A	58	00	00	Halt.	
	B	59	B9	40	Go-to.	
	C	60	B5	40	Go-to.	
	D	61	03	97	Disable selection interrupt.	
	E	62	00	76	Disable interrupt lead.	
	F	63	D8	40	Go-to.	

FILE NO. 005
SHEET 4B OF 4
PROGRAM LOCATION
DTM S/N
CELL E - F
RAM
PROM
ADDITIONAL INFORMATION (WRITE IN)

ADDITIONAL REMARKS

PROGRAM WRITTEN BY: John A. Mansker Jr. DATE
COMPANY NAME: TEL. NO.
ADDRESS:

5.6.7 *Inter-KEY Program Listing*

```
Eg
0298 nop  3150 XMT  0135 REC  0897 INT
0170 232  3250 XMT  0049 -RM  0098 nop
0582 DLY  B350 XMT  0648 -RM  0897 INT
FF71 232  3450 XMT  F092 AUT  C527 PRE
0627 PRE  B550 XMT  9617 TRP  EC40 JMP
EC40 JMP  2050 XMT  0035 REC  0160 MSG
0897 INT  0035 REC  0036 REC  9983 DLY
FF84 INT  0049 -RM  2538 BCC  0163 MSG

0C97 INT  4A41 PRE  4220 TRP  0165 MSG
FF57 xmt  4B40 JMP  1055 xmt  0162 MSG
0D41 PRE  0600 HLT  C321 TRP  7194 AUX
0006 JSW  2029 JEM  4422 TRP  5194 AUX
0000 HLT  0024 -RM  C523 TRP  C550 XMT
C241 PRE  B029 JEM  1695 SYN  4E50 XMT
1347 JFG  0024 -RM  0037 SYN  4450 XMT
1241 PRE  3129 JEM  9241 PRE  2D50 XMT

0247 JFG  0024 -RM  C546 RTJ  D450 XMT
0200 HLT  3229 JEM  0700 HLT  C550 XMT
1147 FLG  0024 -RM  9541 PRE  5350 XMT
1491 AUT  B329 JEM  C644 JEC  D450 XMT
0156 xmt  0024 -RM  0800 HLT  2094 AUX
F092 AUT  3429 JEM  F841 PRE  3194 AUX
1194 AUX  0024 -RM  4745 JNC  0298 nop
5194 AUX  B529 JEM  C925 REC  0099 END

D250 XMT  2241 PRE  CA33 REC  0049 -RM
5550 XMT  0043 JEL  4126 REC  F092 AUT
4E50 XMT  0056 xmt  0030 REC  0035 REC
CE50 XMT  5491 AUT  D116 TRP  0009 RCD
C950 XMT  3094 AUX  0055 xmt  F092 AUT
4E50 XMT  2194 AUX  F241 PRE  E027 PRE
4750 XMT  0092 AUT  0039 JBE  3094 AUX
5094 AUX  0642 PRE  5094 AUX  EC40 JMP

3194 AUX  0696 AUT  6094 AUX  0049 -RM
F042 PRE  0049 -RM  FE70 232  5194 AUX
0049 -RM  F793 AUT  0008 RCD  0052 XMT
0387 CTR  9690 SYN  0012 REC  A050 XMT
0085 CTR  6194 AUX  0089 CTR  C650 XMT
0007 BSW  0235 REC  A841 PRE  4150 XMT
2541 PRE  9650 XMT  0888 JCT  C950 XMT
B247 JFG  9650 XMT  0900 HLT  CC50 XMT

0049 -RM  9650 XMT  0272 232  C550 XMT
3941 PRE  4150 XMT  AC41 PRE  4450 XMT
0029 JEM  2558 BCC  0877 JIO  3194 AUX
0024 -RM  5054 XMT  0C00 HLT  1200 HLT
2941 PRE  4250 XMT  EF93 AUT  0897 INT
B247 JFG  1055 xmt  0273 232  0281 DLY
0049 -RM  C350 XMT  B141 PRE  0194 AUX
FF07 BSW  4450 XMT  0878 JIO  0280 DLY

2F41 PRE  C550 XMT  0D00 HLT  0094 AUX
8247 JFG  C650 XMT  0012 REC  0028 RET
0049 -RM  4750 XMT  A007 BSW  F427 PRE
3A41 PRE  4850 XMT  8075 INT  EC40 JMP
FF29 JEM  C950 XMT  1000 HLT  C350 XMT
0024 -RM  CA50 XMT  0076 INT  D250 XMT
3B41 PRE  4B50 XMT  F593 AUT  C350 XMT
8347 JFG  5091 AUT  8074 INT  E340 JMP

3340 JMP  CC50 XMT  1100 HLT  1300 HLT
0400 HLT  5491 AUT  0076 INT  E1E1 EOF
0500 HLT  D150 XMT  0049 -RM  0000 HLT
3194 AUX  0055 xmt  0052 XMT  B940 JMP
0335 REC  0059 BCC  A053 XMT  B540 JMP
0049 -RM  0015 DLY  6141 PRE  0897 INT
2050 XMT  0035 REC  0043 JEL  0076 INT
B050 XMT  5194 AUX  1094 AUX  DB40 JMP
sx
```

5.7 IBM 3270-Terminal Test: Inter-KEY Program Listing

```
Gg
5047 FLG  4241 PRE  FF46 RTJ  CC41 PRE
2B19 INT  8940 JMP  7F40 JMP  B946 RTJ
0397 INT  0250 XMT  8441 PRE  7F40 JMP
FF57 xmt  0058 BCC  8F40 JMP  3147 FLG
3290 SYN  2750 XMT  3750 XMT  0036 REC
1095 SYN  F150 XMT  0170 232  5094 AUX
0007 BSW  F250 XMT  4081 DLY  0325 REC
0641 PRE  1D50 XMT  0171 232  7F41 PRE

8247 JFG  6150 XMT  0099 END  0039 JBE
0C41 PRE  4050 XMT  0297 INT  2841 PRE
0147 FLG  C150 XMT  1095 SYN  2347 JFG
8940 JMP  C950 XMT  1580 DLY  CF40 JMP
0298 nop  C450 XMT  0171 232  2147 FLG
4050 XMT  1D50 XMT  0282 DLY  0514 REC
4050 XMT  E950 XMT  0298 nop  C440 JMP
7F50 XMT  0052 XMT  0094 AUX  3F41 PRE

7F50 XMT  4050 XMT  1073 232  4247 JFG
1A40 JMP  1350 XMT  8070 232  5247 JFG
1541 PRE  1D50 XMT  0298 nop  5540 JMP
0147 FLG  C150 XMT  4072 232  B841 PRE
8940 JMP  3840 JMP  0287 CTR  7044 JEC
0298 nop  5741 PRE  0049 -RM  DE41 PRE
4050 XMT  8940 JMP  6194 AUX  6146 RTJ
4050 XMT  0250 XMT  3250 XMT  7F40 JMP

4050 XMT  0058 BCC  3250 XMT  7F41 PRE
4050 XMT  2750 XMT  3250 XMT  1347 JFG
2B50 XMT  F350 XMT  0247 JFG  1147 FLG
1047 FLG  F150 XMT  3750 XMT  0041 PRE
2047 FLG  0353 XMT  FF50 XMT  5347 JFG
3047 FLG  1147 FLG  3250 XMT  2E40 JMP
4047 FLG  3940 JMP  3250 XMT  7F41 PRE
A240 JMP  6141 PRE  3250 XMT  1247 JFG

5047 FLG  9040 JMP  0047 FLG  1047 FLG
2441 PRE  0250 XMT  0247 JFG  2041 PRE
0147 FLG  0058 BCC  0049 -RM  3347 JFG
8940 JMP  2750 XMT  1283 DLY  1241 PRE
0298 nop  F150 XMT  0187 CTR  5247 JFG
6050 XMT  7D50 XMT  3084 INT  4247 JFG
6050 XMT  1D50 XMT  0C97 INT  5F40 JMP
1840 JMP  E850 XMT  8071 232  0038 BCC

1082 DLY  1150 XMT  6094 AUX  0214 REC
2B41 PRE  D550 XMT  3217 TRP  5194 AUX
8940 JMP  5050 XMT  0287 CTR  ED41 PRE
1050 XMT  0164 MSG  0897 INT  7D44 JEC
7C50 XMT  1D50 XMT  B441 PRE  C440 JMP
A240 JMP  6050 XMT  0146 RTJ  4147 FLG
3041 PRE  3C50 XMT  E741 PRE  C440 JMP
8940 JMP  5D50 XMT  0246 RTJ  0000 HLT

0250 XMT  F450 XMT  D341 PRE  0000 HLT
3B41 PRE  4B50 XMT  1046 RTJ  0000 HLT
6347 JFG  4050 XMT  2E41 PRE  0000 HLT
6147 FLG  C550 XMT  3B46 RTJ  0000 HLT
1058 BCC  D550 XMT  B741 PRE  0000 HLT
0166 MSG  C450 XMT  3746 RTJ  0000 HLT
0167 MSG  4050 XMT  7F40 JMP  0000 HLT
0163 MSG  B650 XMT  1241 PRE  0000 HLT

0350 XMT  C650 XMT  2247 JFG  0000 HLT
0059 BCC  4050 XMT  0940 JMP  0000 HLT
A240 JMP  E350 XMT  0038 BCC  0000 HLT
6047 FLG  C550 XMT  7F41 PRE  0000 HLT
5147 FLG  E250 XMT  6C45 JMC  0000 HLT
0058 BCC  E350 XMT  5194 AUX  FF40 JMP
3540 JMP  3840 JMP  C341 PRE  0940 JMP
1147 FLG  8241 PRE  6144 JEC  0897 INT
s)
```

APPENDIX A
INTERSHAKE Functions 38 and 58

Function 38, Start Receive BCC (CCC), and Function 58, Start Transmit BCC (CCC), place the BCC calculator logic on the receive data and transmit data paths, respectively, initialize the calculator, and select the proper mathematical calculation model. Each function completes in 3 μ sec and will not be observed on the display.

The proper type of BCC calculation is selected by entering the correct digits, XY, as data.

DATA X:

0 Two check characters; normal calculation of CRC and even LRC
1 Two check characters; inverted data for CRC (used to force error) and odd LRC
2 IPARS cyclic check character (Y must be 5)
3 IPARS check character used to force error (Y must be 5)

DATA Y:

0	CRC-16	$X^{16} + X^{15} + X^2 + 1$
1	CRC-16 reverse	$X^{16} + X^{14} + X + 1$
2	—	$X^{16} + X^{15} + X^{14} + X + 1$
3	CRC-12	$X^{12} + X^{11} + X^3 + X^2 + X + 1$
4	—	—
5	Airline Reservation System	$X^6 + X^5 + 1$
6	CRC-CITT	$X^{16} + X^{12} + X^5 + 1$
7	CRC-CITT Reverse	$X^{16} + X^{11} + X^4 + 1$
8	LRC (6, 7, 8 level)	—

APPENDIX B
Label for IPARS Stand-Alone Monitor

The following label should be typed and placed in the lid of the Stand-Alone Monitor modified for IPARS.

OCTAL SWITCH DISPLAYS REVERSE HEX
(BIT ORDER IS REJUSTIFIED FOR PROPER HEX DISPLAY)

INFO BITS	*BIT ORDER*	*HEX DISPLAY*
NORMAL	8-1	00-FF
8	1-8	00-FF
7	1-7	00-7F
6	1-6	00-3F
5	1-8	00-F7

NOTE: THE HEX DISPLAY MAY INCLUDE OR EXCLUDE PARITY DEPENDING ON THE INFO BITS AND PARITY SWITCHES ON THE DTM-2.

APPENDIX C
Table of Code Conversions

BCD Code						Display Graphic	Printer Graphic	Printer Function	Display Function	Line Function or TCU Command (Input and Output)	IPARS hex	Line hex	INTERVIEW Display
B	A	8	4	2	1								
0	0	0	0	0	0						00	00	hex
0	0	0	0	0	1	1	1				01	20	1
0	0	0	0	1	0	2	2				02	1D	2
0	0	0	0	1	1	3	3				03	30	3
0	0	0	1	0	0	4	4				04	08	4
0	0	0	1	0	1	5	5				05	2A	5
0	0	0	1	1	0	6	6				06	1A	6
0	0	0	1	1	1	7	7				07	38	7
0	0	1	0	0	0	8	8				08	04	8
0	0	1	0	0	1	9	9				09	24	9
0	0	1	0	1	0	0	0				0A	14	0
0	0	1	0	1	1	•	•				0B	34	•
0	0	1	1	0	0	▲		Car Ret	New Line		0C	0C	hex
0	0	1	1	0	1	—				EOM-I	0D	2C	hex
0	0	1	1	1	0	=		Car Ret		Sense	0E	1C	hex
0	0	1	1	1	1					Go Ahead	0F	3C	hex
0	1	0	0	0	0			No-Op			10	0C	hex
0	1	0	0	0	1	/	/				11	22	hex
0	1	0	0	1	0	S	S				12	12	S
0	1	0	0	1	1	T	T				13	32	T
0	1	0	1	0	0	U	U				14	0A	U
0	1	0	1	0	1	V	V				15	2A	V
0	1	0	1	1	0	W	W				16	1A	W
0	1	0	1	1	1	X	X				17	3A	X
0	1	1	0	0	0	Y	Y				18	06	Y
0	1	1	0	0	1	Z	Z				19	26	Z
0	1	1	0	1	0	—	—				1A	16	—
0	1	1	0	1	1	‡	‡				1B	36	hex
0	1	1	1	0	0	Space		Space	Space		1C	0E	Space
0	1	1	1	0	1	—				EOM-C	1D	2E	hex
0	1	1	1	1	0	►			SMI		1E	1E	hex
0	1	1	1	1	1			No-Op			1F	3F	hex
1	0	0	0	0	0	□	□				20	01	hex
1	0	0	0	0	1	J	J				21	21	J
1	0	0	0	1	0	K	K				22	11	K
1	0	0	0	1	1	L	L				23	31	L
1	0	0	1	0	0	M	M				24	07	M
1	0	0	1	0	1	N	N				25	29	N
1	0	0	1	1	0	O	O				26	19	O
1	0	0	1	1	1	P	P				27	37	P
1	0	1	0	0	0	Q	Q				28	05	Q
1	0	1	0	0	1	R	R				29	25	R
1	0	1	0	1	0	:					2A	15	:
1	0	1	0	1	1	<	<				2B	35	<
1	0	1	1	0	0	+		Tab			2C	0D	hex
1	0	1	1	0	1	—				EOM-U	2D	2D	hex
1	0	1	1	1	0	)					2E	1D	)
1	0	1	1	1	1	(				Chng NIA	2F	3D	(
1	1	0	0	0	0	$	$				30	03	$
1	1	0	0	0	1	A	A				31	23	A
1	1	0	0	1	0	B	B				32	13	B
1	1	0	0	1	1	C	C				33	33	C
1	1	0	1	0	0	D	D				34	0B	D
1	1	0	1	0	1	E	E				35	2B	E
1	1	0	1	1	0	F	F				36	1B	F
1	1	0	1	1	1	G	G				37	3B	G
1	1	1	0	0	0	H	H				38	07	H
1	1	1	0	0	1	I	I				39	27	I
1	1	1	0	1	0	?					3A	17	?
1	1	1	0	1	1	.	.				3B	37	.
1	1	1	1	0	0	%		Index			3C	0F	%
1	1	1	1	0	1	—				EOM-PB	3D	2F	hex
1	1	1	1	1	0					Sync 2	3E	1F	hex
1	1	1	1	1	1					Sync 1	3F	3F	hex

APPENDIX D
Reading an Inter-KEY Program Listing

The address and entry columns to the right of the Inter-KEY program listing on the opposite page are adapted from the INTERSHAKE II Program Sheet to show the correspondence between the listing and the program sheet.

One side of an INTERSHAKE program sheet contains a total of 32 steps; thus 64 steps fit on one sheet (both sides); and four full program sheets are required for a full 256-step program.

The program sheet carries both hexadecimal and decimal step-page addresses.

Program steps are usually identified by the two-digit hexadecimal addresses, from 00 to FF. In the editor mode the INTERSHAKE program is displayed on the CRT in its hexadecimal address form, and hexadecimal addresses must be used in writing cross-referenced instructions within programs.

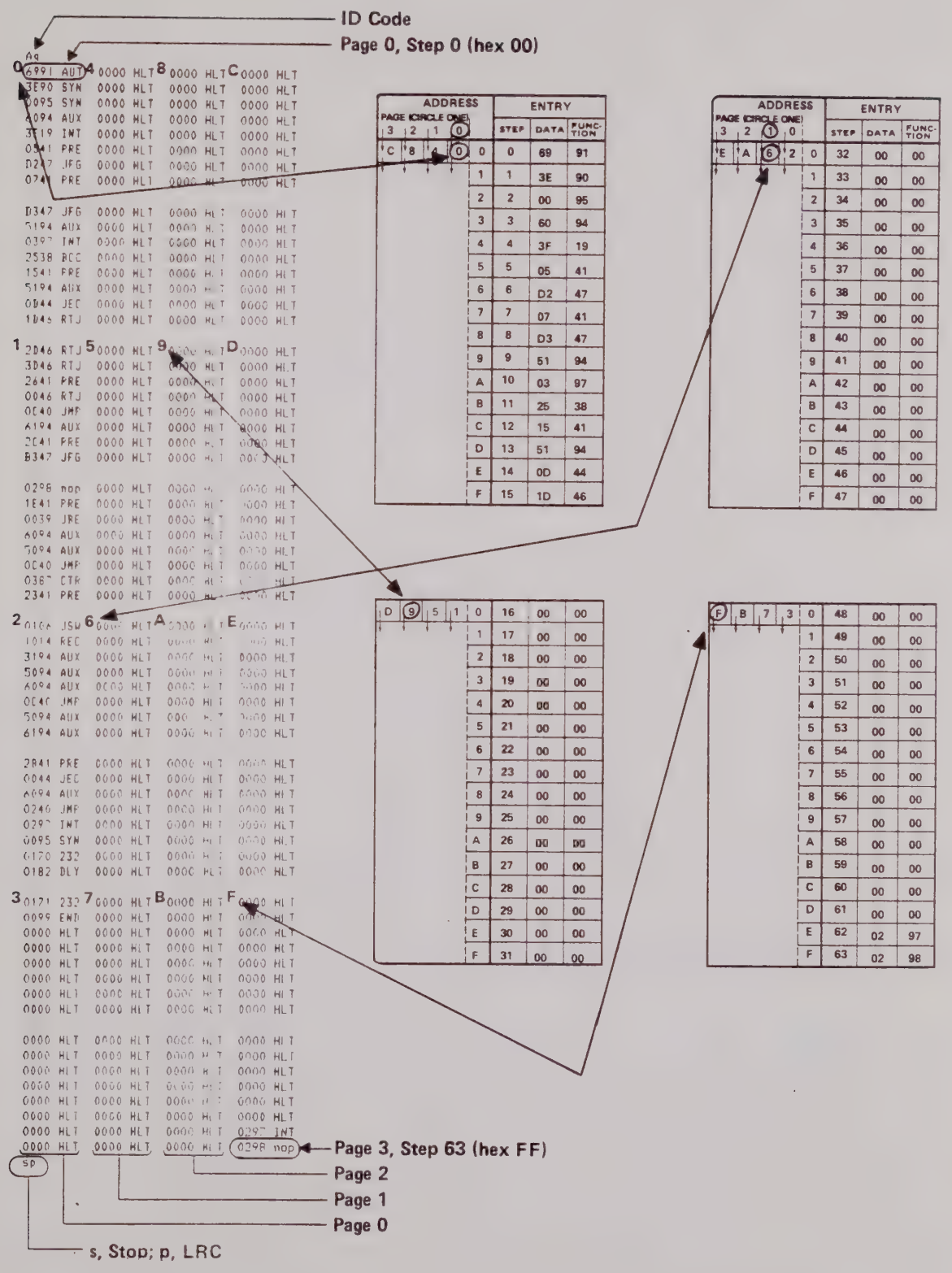
In the INTERSHAKE panel display (Zone 7), program addresses are shown in decimal form: Steps 0-63, Pages 0-3.

One column of the Inter-KEY listing represents one program memory page and corresponds to one full program sheet; four columns, to four full program sheets or one full-cell 256-step program.

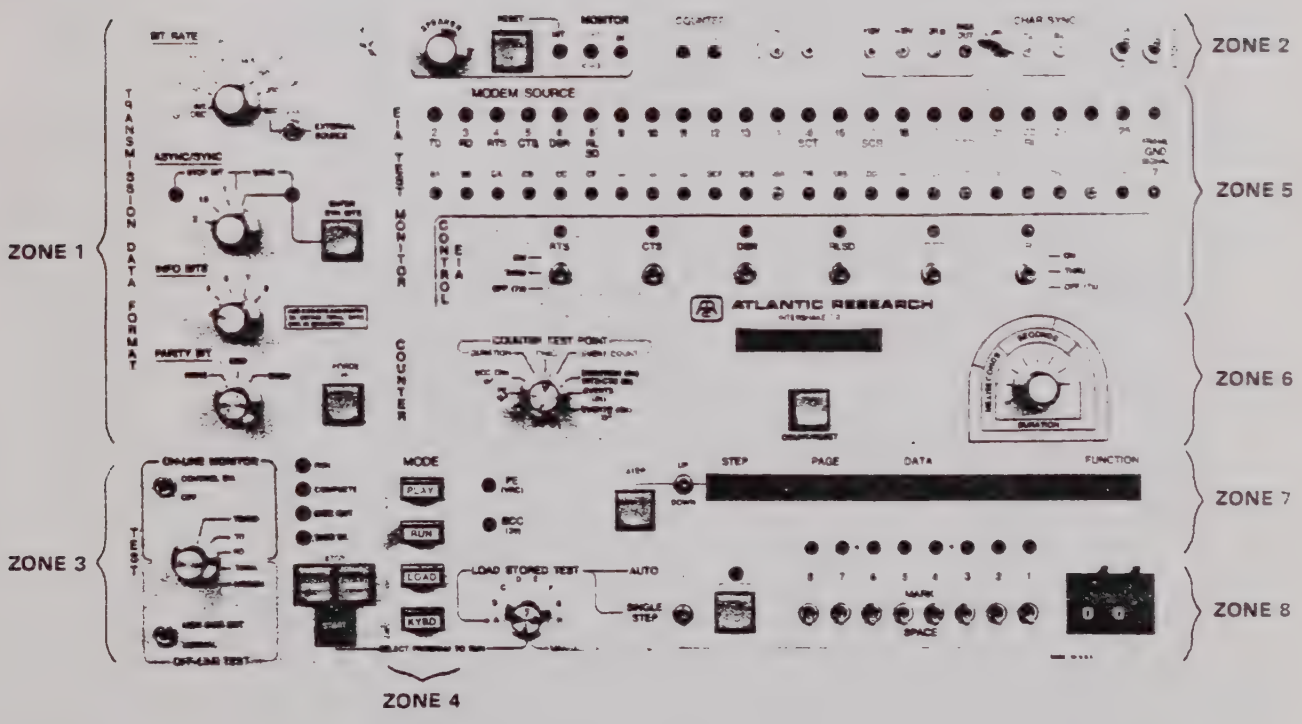
The columns are divided into groups of eight instructions to make it easier to locate specific addresses.

The three-character mnemonics facilitate recognition of the corresponding functions.

The term *data* is synonymous with operand; *function* is used for operation code. INTERSHAKE instructions are always written in the order data-function.


ID Code
Page 0, Step 0 (hex 00)
ADDRESS
PAGE (CIRCLE ONE)
3 2 1 0
ENTRY
STEP DATA FUNC-TION
C 8 4 0
E A 6 2
D 9 5 1
F B 7 3
Page 3, Step 63 (hex FF)
Page 2
Page 1
Page 0
s, Stop; p, LRC

APPENDIX E
INTERSHAKE Panel Zones



SI 842-2B
Files D01, D02, and D03

PROTOCOL AND DIAGNOSTIC TESTING OF 3270 (and 3275) SERIES TERMINALS

MOD 2: 1920 Character CRT

with the INTERSHAKE System

Published by

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NOTICE

The information contained in this manual is believed to be accurate and is intended to be used as the basis for testing the equipments described with an Atlantic Research Corporation INTERSHAKE Model DTM-2.

Owing to the nature of software/firmware support and variations among different manufacturers of these equipments, Atlantic Research Corporation can assume no responsibility or guarantee that the results achieved will match those described herein.

Any written comments for improving the test or this descriptive document are welcome.

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FOREWORD

to SI-842-2B, April 1979

This corrected and revised edition was occasioned by some revisions in the INTERSHAKE II firmware for 3270-terminal testing.

In addition to firmware Filed D01 (EBCDIC) and D02 (ASCII), there is now available a combined file (D03) that includes both the EBCDIC and ASCII versions of the test. A special message form for the Teletype 40/4 equipment is also available. The options are described in Part II, Section 1.

Two changes of substance have been made in the firmware programs, permitting (1) dial-up and (or) (2) new sync clock clamp operation. These modifications are reflected in Appendixes A and B and in the text. The program changes are especially significant with regard to editing options (see Table 1-1 for a summary).

Instructions for running the Endurance Test have been simplified (Part I, Section 5.8).

The revised written programs in the Appendixes have been supplemented with Inter-KEY printouts, which list data (operands), functions (OPCODEs), and three-character mnemonics for the entire program on one page (see Part II, Section 4.3 for further explanation).

The content of the message PROMs is presented in Appendix C, with the corresponding hexadecimal entry shown for each character.

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PART I

OPERATION

1.0 GENERAL DESCRIPTION

This test is applicable to CRT terminals and printers using the protocol of the 3270 series or equivalent such as the teletype DATA SPEED 40/4. Provisions are included to test the more recent stand-alone 3275 series which uses a slightly different error recovery algorithm.

Two major test requirements are (1) to enable a terminal operator to verify that the terminal is operating properly (with minimal technical support), and (2) to provide in-depth diagnostic capability so the INTERSHAKE operator can localize a problem when the terminal is determined to be defective. Additional editing provisions are included to assist the operators in detail troubleshooting.

INTERSHAKE (DTM) is used to emulate the CPU or Front End Processor for numerous interactive message exchanges with the terminal. INTERVIEW displays selected transmissions for visual analysis of both transmit and receive signals.

Connection of the INTERSHAKE (DTM) into an operating system is accomplished at the RS-232 interface. Testing may be directed from the CPU location through modems or locally at the terminal without modems.

Point-to-point or multidrop (switched carrier) networks are accommodated to strengthen the versatility of the test.

CAUTION

> Network layouts differ (especially for multidrop circuits), and a user should *thoroughly understand the consequences of taking any part of the system off-line* to run this test.

Unused space is available in the program to add short test routines that could be useful for special applications. INTERSHAKE has an internal capacity for *seven separate programs* of this overall sophistication.

1.1 Features and Capabilities

The simplicity of permitting the terminal operator to verify correct terminal operation unassisted by test personnel is possible because the INTERSHAKE can store selected characters received from the terminal; then retransmit these characters inserted into an instructional format for display on the terminal. This selective echo capability is virtually self-checking, which allows for a wide range of operator skills.

Additional in-depth diagnostics are included to quickly and accurately define a fault condition.

This test provides a very thorough evaluation of a terminal. Its applications include the following:

- Data communication diagnostics
- Teaching tool for the BiSync Protocol

- Instruction vehicle for terminal operators
- Front End Processor emulator
- Development aid for terminal application software
- Basis for evaluating terminal vendors
- Printed record of the test completion

Sections 1.1.1-1.1.7 identify the detailed capabilities that this test provides the user.

1.1.1 Keyboard Logic Tests

a. All AID keys

b. Manual TAB to next non-protected field

c. Numeric keys (restricted)

d. Upper-lower case

e. Buffer address follows cursor (see Section 4.1.3)

f. Keyboard lockout by CPU

1.1.2 Display Logic Tests

a. Protected fields

b. Protected hidden fields

c. Nonprotected hidden fields

d. Auto-tab to next nonprotected field

e. Cursor addressing (insertion of cursor)

f. Attributes

g. Erase/write resets cursor home

h. Write from last address

i. Pincushion of top and bottom lines

j. Screen focus and brightness

k. Contrast adjustment pattern

l. Read the cursor address on the display (to the host CPU)

1.1.3 Terminal Options Displayed

a. Upper – lower case

b. Highlight

c. Blink

d. Buffer – nonbuffered display

e. Bell tone

1.1.4 Terminal Communication Tests

a. Automatic terminal ENQ recovery. Should the 3270 interactive communication not terminate, in an orderly fashion (e.g., with an EOT from the DTM) the 3270 will, after 3 seconds, generate an ENQ. The ENQ will be repeated from the terminal approximately every 3 seconds. Upon receiving an ENQ from the 3270, the DTM will interrupt and issue a RESET and GENERAL POLL. Normally an EOT response will be generated by the 3270. The idle condition will be RESET and SPECIFIC POLL by DTM with EOT responses from the 3270.

b. Automatic text blocking at 256 characters

c. Number of Sync characters

d. Operation and timing of RTS, CTS, RLSD, DSR leads

e. Real time display of turnaround time (for terminal to check BCC and reply)

f. Terminal detection of BCC error. The error recovery routine of the terminal is fully exercised by forcing a BCC error and verifying that the terminal rejects it.

g. Modem strapping options

h. Modem turnaround time

1.1.5 BCC Error

For each transmission received from the 3270, the BCC is calculated by the DTM and verified. ANY BCC ERROR terminates the test with END. When the test ends, the INTERVIEW CRT will freeze the last DTM-3270 sequence. The DTM BCC error light will be ON.

1.1.6 No Terminal Response

After each DTM transmission, the interrupt timer is activated. If no response is received from the terminal in 3 seconds, the program issues a RESET and GENERAL POLL. The system will continue to issue Reset and General Polls at 3-second intervals until a response is received.

1.1.7 Protocol Faults

The following faults are checked by the DTM program and terminate the test with END.

a. Out of sequence ACK 0, ACK 1. Note that an AID message in response to a SPECIFIC POLL qualifies as an ACK 0, so the first ACK observed in response to AID ECHO is ACK 1.

b. Receipt of RVI or WACK from the 3270.

c. Receipt of any character from 3270 (as the first NON SYNC character) other than SOH, STX, DLE, NAK, EOT.

d. Receipt of any character from 3270 after SOH other than %.

e. Character received following % must be / or R.

The reader should refer to the Receive Program Modules in Part II, Section 3.0, for a definitive view of the program termination criteria.

1.2 EBCDIC versus ASCII

The Protocol is independent of the code used; therefore, there are only two changes required: (1) The characters must be changed to the correct code; (2) EBCDIC uses a CRC (2-character polynomial) whereas ASCII uses an LRC (1 character).

This document applies to both EBCDIC and ASCII. The symbols and hexadecimal characters are given for both cases in the applicable sections. Part II contains the actual program variations.

2.0 3270 PROTOCOL

This protocol is of the general BISYNC format. Communication between INTERSHAKE and the terminal forms an interactive exchange of messages that cascades until it is several interchanges deep before proceeding to the next class of exchange.

A brief description of the protocol elements tested is given below. The appropriate user's guide for the specific terminal (and support software) should be consulted for more details.

CAUTION

There may be slight variations in the way some "look-alikes" *actually implement the protocol.*

The program exercises six different categories of terminal operation.

1. INTERSHAKE generates a general poll after power-up to retrieve status and sense (S&S) for each device (on the controller).

2. INTERSHAKE generates a specific poll to request the AID keys be operated; received AID characters are echoed to the 3270 screen.

3. Operating the 3270 Request Test Key (RQTST) causes the INTERSHAKE to generate a test message form to the terminal.

   a. The first transmission of the form contains a forced BCC error.

   b. A NAK response by the 3270 causes INTERSHAKE to retransmit the test message form with a good BCC.

4. The 3270 operator fills in applicable portions of the test message form on the CRT to check attributes.

5. The 3270 sends the entered data to the INTERSHAKE which ECHOES the data to the 3270 CRT to verify other attribute characteristics; e.g., hidden fields.

6. Completion of the test writes "END OF TEST" on the 3270 screen and returns to a general poll.

Details of the protocol are shown in Figure 1-1.

3.0 3275 PROTOCOL

The 3275 protocol is substantially identical to the 3270 protocol except for the recovery from a BCC error received by the terminal. All six categories of tests described in Section 2.0 apply. Changes are to category 3:

Operating the 3275 Request Test (RQTST) key generates a test message form to the terminal.

a. The first transmission contains a BCC error.

b. The terminal responds with an EOT.

c. INTERSHAKE replies with reset and specific poll to retrieve the Status and Sense. S&S, when pending, takes priority over other possible replies. S&S for a BCC error is "A (SP)."

d. An RVI response by DTM clears the S&S and the terminal responds with EOT to terminate the interchange. *Note:* for *unbuffered* 3275 displays the STATUS (error) light will remain ON until RVI is received even though the erroneous message is displayed.

e. The 3275 RQTST key must be operated (the second time) to retrieve the message again from the DTM-2 . . . . . this time with a good BCC.

Further details of the protocol are shown in Figure 1-5.

4.0 3270/75 OPERATION

This section describes the operator interaction at the terminal. See Section 5.0 for DTM setup instructions. The operator should recognize that a *200 ms* polling delay is used. Refer to Section 5.9 to decrease or increase the delay.

4.1 Operator Sequence, 3270

The following sequence of terminal operator interactions with the terminal is shown in the preferred order and is illustrated by Figure 1-1. Variations are possible.

4.1.1 Power up terminal (and controller) and START the INTERSHAKE.

4.1.2 CLEAR key clears CRT. After a delay, the CRT will display AID – at the home position. The aid symbols will be highlighted.

4.1.3 Operate the other AID keys and note the display.

Key	Display	
PF 1	AID 1	Type Read
PF 2	AID 2	
PF 3	AID 3	
PF 4	AID 4	
PF 5	AID 5	
PF 6	AID 6	
PF 7	AID 7	Long Read
PF 8	AID 8	
PF 9	AID 9	
PF 10	AID :	
PF 11	AID #	
PF 12	AID @	
ENTER or S/R	AID' (apostrophe)	
PA 1	AID %	Short Read
PA 2	AID >	
PA 3	AID, (comma)	
Clear	AID _ (underline)	

4.1.3.1 There are three major types of variations in the AID display depending upon the terminal manufacturer (and model vintage). The observed variations are described below. Other patterns MAY NOT be indicative of a faulty terminal; however, they *should* be called to the attention of the user as the application programs may be affected when the response to an AID key is a WRITE instruction from the computer.

TYPE 1: IBM 3270 SERIES

- All Long Read keys and CLEAR will display AID and its associated symbol at the HOME location.
- All Short Read keys will display AID and its associated symbol at the CURSOR location.

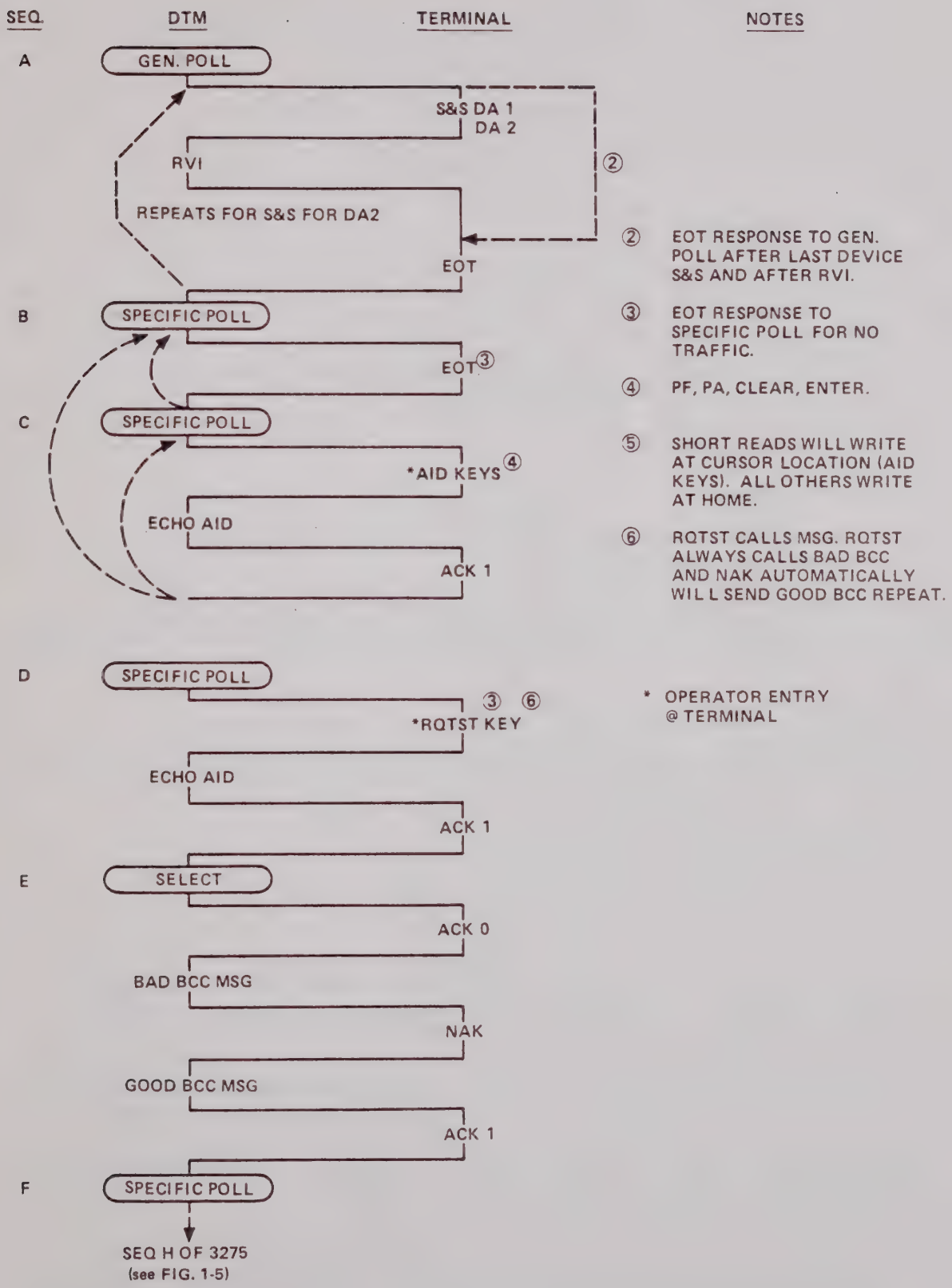


Figure 1-1. 3270 Flow Sequence (Two Devices).

TYPE 2: DATA SPEED 40/4 SERIES

- All Aid keys except CLEAR will display at the CURSOR location. The maximum number of AID(s) to be simultaneously displayed will be 21.

- CLEAR will display at the home location.

The recommended operator sequence for the Data Speed 40/4 is:

Line 1 CLEAR, PF1 to PF9 Displays:

```
AID _   AID 1   AID 2   AID 3   AID 4   AID 5   AID 6   AID 7   AID 8   AID 9
```

Line 2 PF10, PF11, PF12, PA1, PA2, ENTER (S/R) Displays:

```
AID :   AID #   AID @   AID %   AID >   AID '   AID /
```

Note: RQTST will momentarily display AID / before the screen is erased and the test Form is displayed.

TYPE 3: OTHER

- All AID keys will display at the HOME location; therefore, only one AID will be displayed at a time.

4.1.3.2 After the AID symbol the cursor is left in a protected field and the operator may NOT enter data from the keyboard here or in the next position. A nonprotected field begins two positions to the right of the cursor following an AID echo.

4.1.4 Operate the CLEAR Key to clear the 3270 display.

4.1.5 Operate the Request Test (RQTST) key. *Momentarily* the screen will show AID 1.

The test message will display the RQTST form shown in Figure 1-2.

High-light attribute options can be determined as follows from the top line:

"3270 75" is intensified.

"TEST" is blinked.

Some models provide for both options. The specific manufacturer's manual should be consulted to determine whether independent fields will interact.

Cursor position is placed at the start of the first *non-protected* field. The entire screen is protected except for the three non-protected fields defined by $>$ $<$. The operator manually fills the three fields.

4.1.5.1 The ALPHA field is filled with any alpha-numeric characters such as the name of the terminal system. When the cursor is on the "$<$" symbol at the end of the ALPHA field, the screen is protected. Operate the cursor tab key to move the cursor to the next field.

4.1.5.2 The NUMERIC field is filled with only numeric digits such as the date of the test, minus (-), and period (.). The last (10th) character in the NUMERIC field will automatically tab the cursor to the ALPHA – NON-DISPLAYED field.

Row

```
 1                              3270 75 TEST
 2
 3 ********************************************************************************
 4 ................................PROTECTED.....................................
 5                             >  DISPLAYED <
 6                             >            < NON-DISPLAYED
 7
 8 ............................NON-PROTECTED.....................................
 9                             > .......... < ALPHA
10                             > .......... < NUMERIC
11                             >            < ALPHA NON-DISPLAYED
12
13
14 INTERSHAKE Analyzes And Finds Your Data Communications Problems Fast! 1234567890
```

NOTES:

1. 3270 75 is highlight (if option is enabled).
2. TEST is Blink (if option is enabled).
3. Row 14 is highlight (if option is enabled).
4. Cursor is at Row 9.
5. Pincushion of top row of ***.
6. Leave cursor at end of field on Row 11.

Figure 1-2. RQTST Display.

4.1.5.3 The ALPHA NON-DISPLAYED field is also filled with any alpha-numeric characters such as the operator's name. The cursor should be positioned on the ">" symbol at the end of the field.

4.1.6 Operation of the ENTER key sends the data entered onto the form (plus selected parts of the form) to the DTM which then ECHOES the message to be displayed on the screen as shown in Figure 1-3.

4.1.6.1 Note that the *protected, hidden* (or non-displayed) field of the original form is now displayed "NON-DIS." All operator-entered data in the three fields will also be displayed for verification.

4.1.6.2 Should the original form be displayed in a default condition, i.e., the proper ACK was not received prior to operating ENTER, the AID ' would have appeared at the home cursor position of the form. This is most likely to occur in a non-buffered terminal or when the terminal does not detect the erroneous BCC properly.

4.1.6.3 The three characters at the home location of the screen show the echoed ENTER aid character and the echoed cursor address (Row, Column) when the ENTER key was operated.

- ' ((is displayed when the form has been completely filled in and the cursor is positioned on the <symbol at the end of the third field.

' ¢ S is displayed when the form has not been filled in and the cursor is unmoved from the position directed by the RQTST key (Row 9, Column 45).

') " is displayed for the cursor location at the last character position on the screen (Row 24, Column 80).

Consult the terminal manual for verification of any other cursor address on the terminal display. Many application programs "read" the cursor position from the terminal to verify that the operator has followed the operating instructions properly. This is an important aspect of the test.

4.1.6.4 After the Enter form (Figure 1-3) is displayed, the terminal bell will sound (if the terminal is so equipped and it is enabled).

4.1.6.5 A Record of the test (Figure 1-3) will be printed automatically by the printer attached to the terminal after the terminal bell sounds. For terminals that do not contain a printer this operation is ignored.

4.1.6.6 The printed record may contain *additional operator*-entered data such as Circuit Number, Data Rate, etc.

Although the message form in Figure 1-2 is protected except for the three indicated fields, an AID echo will open up an additional nonprotected field beginning two character positions after the aid symbol.

a. Operate the RQTST key.

b. After filling in the three standard fields the operator should position the cursor to "1" in the test message.

c. Move the cursor down nine rows to the bottom row and operate the PA1 or PA2 key.

d. Observe the AID symbol is echoed as an *addition* to the form.

```
ROW
 1  [!] (  (                        3270 75 TEST
 2
 3
 4
 5
 6                                    NON-DIS
 7
 8  ..............................NON-PROTECTED.................................
 9                                  > ATL RES CO <
10                                  > 12 17 1977 <
11                                  > MS T JONES <
12
13
14
15
16
17
18  INTERSHAKE and INTERVIEW Join Together To Quickly Simulate and Analyze Your Data
19   Communications Problems! 1234567890 #&@/-.....................................
20  ..............................................................................
21  ..............................................................................
22  ..............................................................................
23  ..............................................................................
24  ..............................................................END OF TEST
```

NOTES:

1. Enter Key Symbol at cursor at Home position.
2. Cursor address (Row) character at position 1 "C" for Row 11.
3. Cursor address (column) character at position 2 "C" for Column 46.
4. NON-DIS on Row 6 *was* hidden before.
5. Fields on Rows 9, 10, 11 appear as entered.
6. Rows 18, 19 are highlight.
7. Row 19 Column 1 is a space (quickly identifies 80 character row above).
8. END OF TEST takes the last character position.
9. Bell rings.
10. Printer prints contents of CRT.
11. Row 24 of Dots checks for Pincushion.

Figure 1-3. Enter Response Display (after RQTST).

e. Move the cursor "right" two strokes and it will be at the Home location.

f. Up to 32 characters may be operator entered on the form until the protected 3270 field is encountered.

g. Operating ENTER will echo the message form as shown in Figure 1-3 with the additional descriptive operator-entered data on the top line as shown in Figure 1-4.

NOTES

1. The ENTER and cursor address characters normally displayed at the home position are written over and do not appear.

2. The AID symbol is overwritten by END OF TEST.

3. Terminals that position all "write" instructions at the home locations require entering AID at home and this shortens the space available.

4. Other nonprotected fields can be established with any AID echoed anywhere on the screen.

5. Care must be exercised not to enter more than 46 characters since the block will then exceed 256 total characters. (See Section 4.5.1.)

4.1.7 The test will continue with a general poll, etc., except the keyboard will be locked out. The operato should operate the Reset/Local key to resume the test.

Refer to Section 5.0 for various edit options to terminate the test, restart the test, or perform an ENDURANCE checkout.

4.1.8 At the end of the test the operator may select the local print mode of the terminal (if so equipped) to obtain a printed record of the test as shown in Figure 1-3.

4.2 Operator Sequence, 3275

The following *deviation* from the 3270 procedure given in Section 4.1.5 is required for the 3275. Figure 1-5 shows the flow chart of operation.

4.2.1 Operate the Request Test (RQTST) key. Momentarily AID 1 will be displayed.

The test message will immediately begin to be written on an unbuffered CRT, and when complete, the STATUS LED will illuminate on the 3275 panel momentarily. On a buffered terminal, only the STATUS light will blink on.

The operator must operate the RQTST key again and observe that the form is displayed and the STATUS light did *NOT* blink on.

Successive operation of RQTST will result in alternation of a bad message, then a good message, a bad message, and so on.

```
Row
 1  CKT 43K16Y-4  ADRS ABA  4.8KBS   3270 75 TEST
 2
 3
 4
 5
 6                              NON-DIS
 7
 8  ................................NON-PROTECTED.....................................
 9                                 > ATL RES CO <
10                                 > 12 17 1977 <
11                                 > OP T JONES <
12
13
14
15
16
17
18  INTERSHAKE and INTERVIEW Join Together To Quickly Simulate And Analyze Your Data
19   Communications Problems! 1234567890 #&@/-.....................................
20  ..............................................................................
21  ..............................................................................
22  ..............................................................................
23  ..............................................................................
24  ..............................................................END OF TEST
```

Figure 1-4. Enter Response Display (after RQTST) with Comments of Record in Row 1.

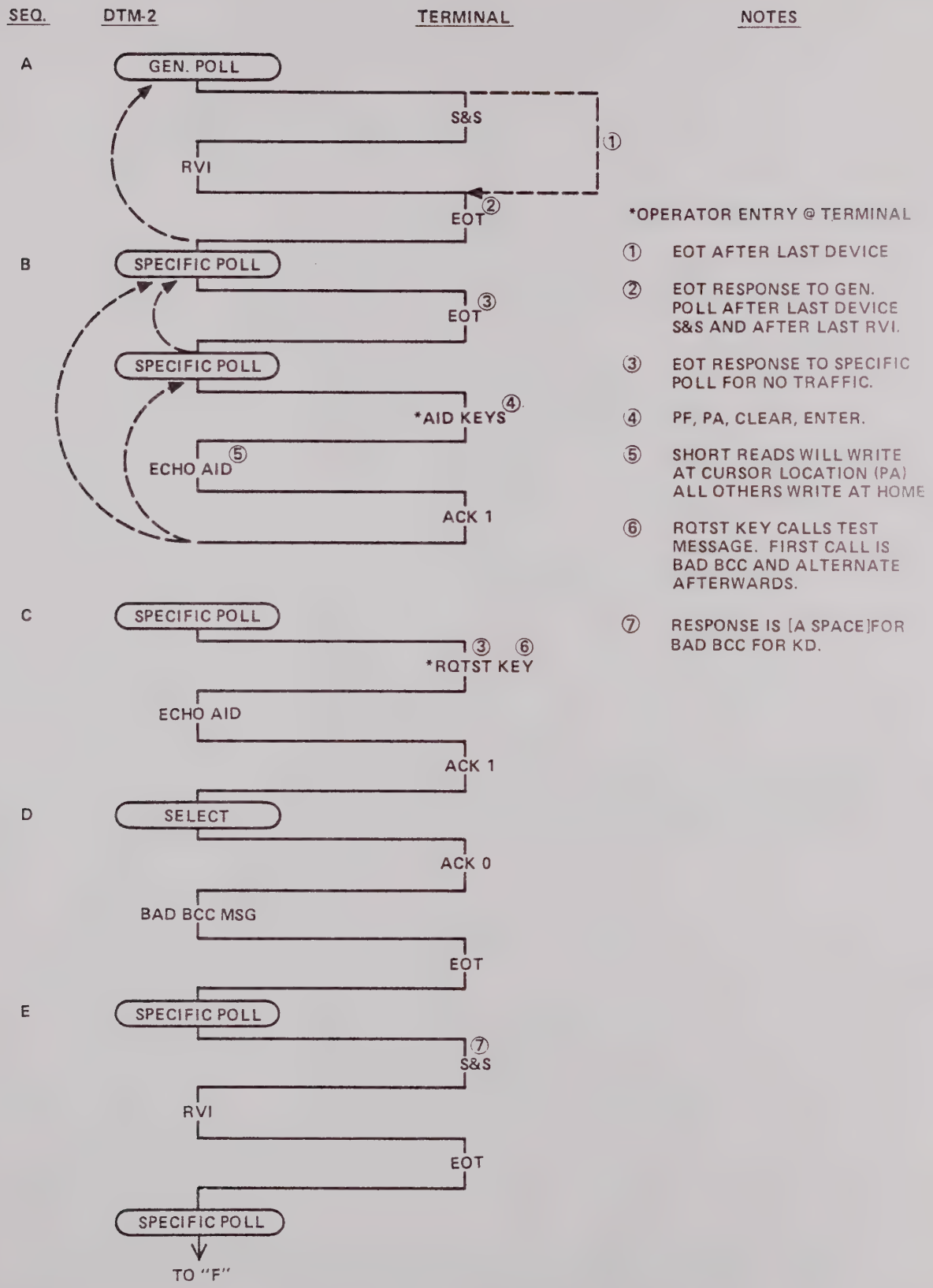


Figure 1-5. 3275 Flow Sequence (One Device).

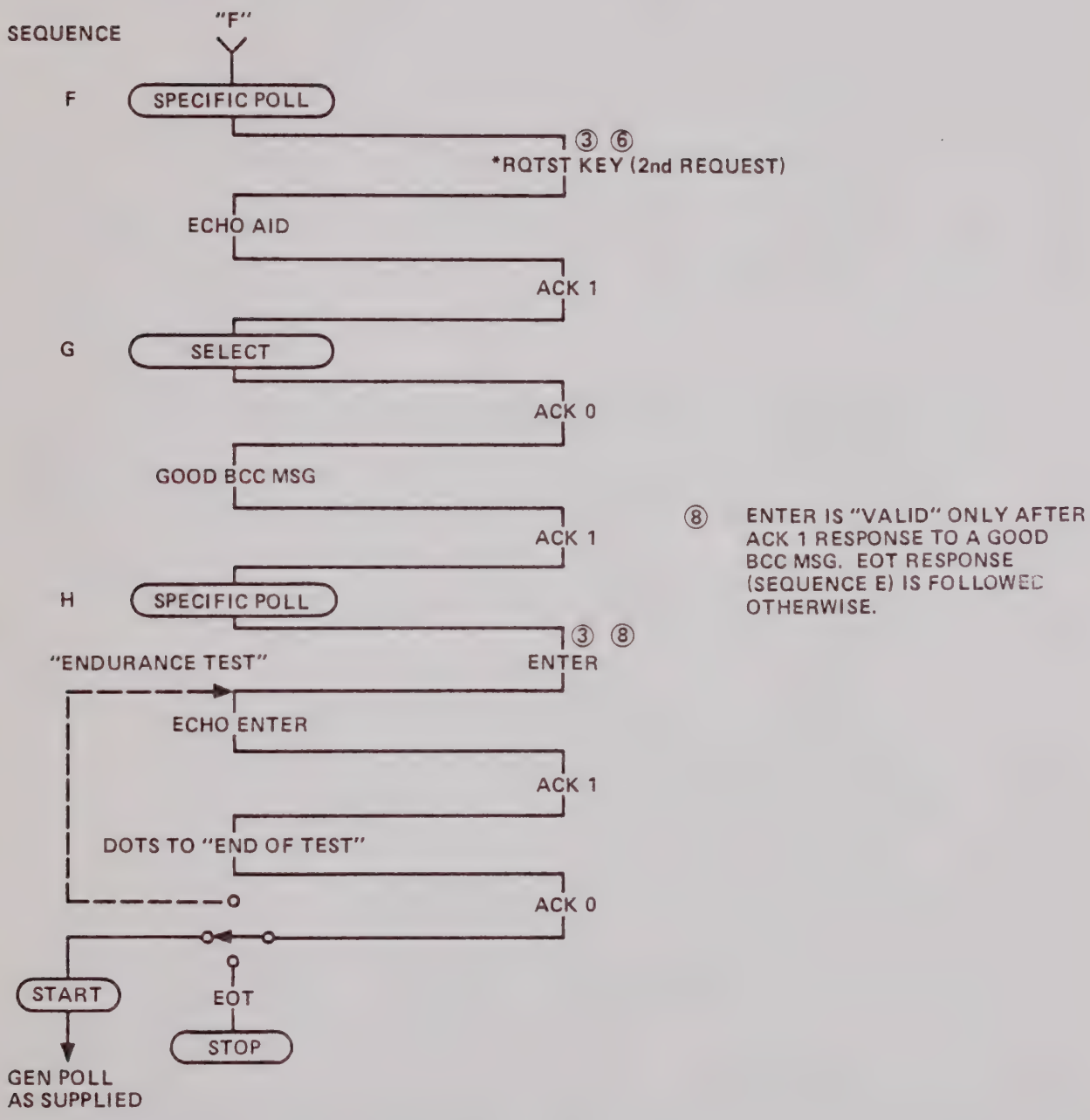


Figure 1-5. (Concluded).

4.3 Indicators: 3275

The 3275 terminal contains an indicator panel. The major communication-oriented indicators are described below for the BISYNC, non-dial models.

SYSTEM READY: terminal and signal source are connected together.

SYNC SEARCH: blinks during communication.

SELECTED is on when the CRT is being addressed by the CPU, e.g., during receive message.

INPUT INHIBITED is on when the keyboard is locked out due to CPU direction, or to an operator error such as trying to type characters on a protected part of the display. Operate the RESET key to enable the keyboard. In the Endurance test, the keyboard is locked out to prevent interruption of the test.

TRANSMIT is on when the terminal transmits. Observation of transmit should show a wink for each poll answered.

STATUS is on for problem conditions within the terminal, e.g., for a received BCC error.

4.4 Auto and Interactive Modes

Set up of the DTM-2 determines whether communication is required between the 3270 operator and the DTM-2 operator.

4.4.1 In the AUTO mode, the DTM operator only sets up and starts the test for the 3270 operator. The poll rate is set to 200 ms. Refer to Section 5.9.

The 3270 operator can control the tests if all the tests perform properly. Tests may fail in two ways:

1. A "soft" failure will be detected by the operator (and perhaps not be detected by the DTM). An example of a soft failure would be an echo of the wrong AID key such as the PF 2 key displaying AID 3.

2. A "hard" failure is detected by the DTM and terminates the test. The test can only be restarted by the DTM operator. A hard failure will automatically freeze the last transmission from the DTM and the response from the terminal.

Specifics of where the test failed (supplied by the 3270 operator to the DTM operator) will permit the DTM to be set up in the INTERACTIVE mode for detail diagnostics of the protocol by the DTM operator.

Response time measurements and other protocol details are displayed to the DTM operator in the AUTO mode to verify the test progress.

4.4.2 In the INTERACTIVE mode, the 3270 operator performs *all* of the same actions; however, each transmission from the DTM is *manually released* by the DTM operator. The DTM-2 operator is in control of the test and "interacts" with the DTM as well as with the terminal operator.

Verbal communication is normally necessary in this mode, though not essential since the 3270 responses displayed on the INTERVIEW show

a. what key was operated; and

b. the contents of the 3270 display.

CAUTION

When the interactive mode is used, if the operator delays in releasing the next message to the terminal for more than 3 *seconds*, the terminal may time-out and respond with ENQ (except after an EOT from the DTM). The DTM will interrupt itself when receiving an ENQ and reply with RESET & GEN POLL.

4.5 Additional Tests

4.5.1 256-Character Block

The terminal will automatically limit transmitted text to a maximum size of 256 characters per block. A "full" block of 256 characters will end with ETB instead of ETX. This INTERSHAKE test will withhold its response to an ETB from the terminal. After the terminal senses than 3 seconds have elapsed without a response, the terminal will send an ENQ. INTERSHAKE will detect the ENQ and reply with a reset and general poll. The terminal will then resume EOT replies to polls. Terminal operation is as follows:

a. Operate CLEAR and observe AID — on the terminal.

b. Move cursor 2 characters to the right into the start of the NONPROTECTED field of the display.

c. Operate the . (period) key in the repeat mode to write 4 lines of dots on the display. Approximately 320 characters of text are now on the screen.

d. Operate ENTER (S/R) to send the first 256-character Block. The data paths will then become quiet for 3 seconds; Polling will resume *ONLY* if the terminal times out and generates an ENQ.

e. The DTM operator will observe on the INTERVIEW the 256-character message ending with ETB followed by the ENQ which resumes the normal poll response.

f. Operate CLEAR on the terminal and observe the echoed AID — as this test cycle is now complete.

4.5.2 Three-Second Terminal ENQ Recovery

When the terminal does not receive an anticipated reply within 3 seconds, an ENQ will be generated. The terminal will repeatedly send ENQ at 3-second intervals unless the last transmission received ended with EOT. A technique for verifying this ENQ recovery is described in Section 4.5.1.

5.0 DTM-2 OPERATION AND PROGRAM EDITING

The INTERSHAKE 3270 test program is a rather inclusive general purpose program incorporating extensive features. Many steps may be enabled or disabled; parameters may be edited, and so on. Table 1-1 lists the editing options described in Sections 5.2 through 5.11. On the program sheets in Appendices A and B the data or functions to be edited are enclosed in parentheses.

The address of the step to be edited is written as STEP-PAGE (HEX) to accommodate the widest possible user experience and familiarity with numbering systems. For example, 63-1 (7F) is Step 63, Page 1 (hexadecimal 7F).

5.1 Loading the Program

This program requires that the DTM operate in the 256-step cell mode. Internal DIP switch 5 must be ON and the LEFT-HAND decimal ON at the PAGE display to indicate the 256-step cell is selected. (The decimal OFF indicates the 128-step cell mode.)

5.1.1 The program may be manually loaded into cell C/D, E/F, or G/H. The program should not be *manually* loaded into cell A/B in normal situations as cell A/B is reserved as a scratch pad for all firmware stored tests.

5.1.2 This test is available as an INTERSHAKE firmware stored test, consisting of three PROMs that can be installed by the user. (See Part II, Section 1.0 for further information.) Operating the DTM with the LOAD toggle in AUTO will place the program into RAM cell A/B where the program may be edited. Since RAM A/B is non-volatile (has battery backup), an edited program can be saved until another stored test has to be called into A/B.

NOTE

As soon as the firmware stored test program has been loaded, move the LOAD toggle to MANUAL.

5.2 Terminal Addresses

The 3270 protocol utilizes three addresses:

SPA Station Poll Address (e.g., to master controller)
SSA Station Select Address (e.g., for device controller)
DA Device Address (for each device on the controller)

These addresses are manually entered into the DTM program for the terminal and controller(s) under test. Only one device can be tested at a time with this program, although other programs could automatically sequence through controllers and devices for other tests.

The program is supplied with address number 0 for SPA, SSA, DA.

5.2.1 Station addressing uses the following sequential assignments where station number 0 corresponds usually to the CPU site test terminal (so it can access any port):

	SPA or DA			SSA		
Number	Char.	EBCDIC hex	ASCII* hex	Char.	EBCDIC hex	ASCII* hex
0	SP	40	20	–	60	BD
1	A	C1	C1	/	61	2F
2	B	C2	42	S	E2	D3
3	C	C3	C3	T	E3	54
4	D	C4	44	U	E4	D5
5	E	C5	45	V	E5	D6
6	F	C6	46	W	E6	57
7	G	C7	C7	X	E7	58
8	H	C8	C8	Y	E8	D9
9	I	C9	49	Z	E9	5A
10	[¢	4A	5B	:	6A	7C
11	.	4B	AE	'	6B	2C
12	<	4C	BC	%	6C	25

*Odd parity.

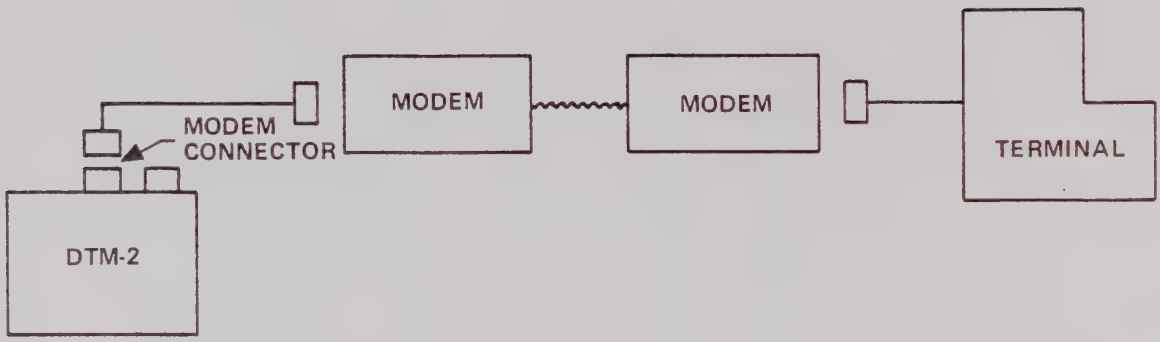
5.2.2 ENTRY OF ADDRESSES into the test program is easily accomplished. Function 98 (No-Op) precedes each address entry to facilitate finding the desired location.

With the Inter-KEY editor, the FIND command may be used to locate instruction 0298 quickly.

With the DTM-2 panel switches, select Function 98 and Data F0, operate STEP and then hold toggle switch UP. The program will display Step 12 Page 0. Stroke UP once to display Step 13 for the general poll.

DTM Address				As Supplied	Enter
Step		Page	(HEX)		
13	–	0	(0D)	40	SPA
14	–	0	(0E)	40	SPA
		Operate UP to scroll to **Specific Poll**			
22	–	0	(16)	40	SPA
23	–	0	(17)	40	SPA
24	–	0	(18)	40	DA
25	–	0	(19)	40	DA
		Operate UP to scroll to **Select**			
37	–	0	(25)	60	SSA
38	–	0	(26)	60	SSA

5.3 REMOTE: Test Modem



The following is an outline of the DTM panel settings. The panel is shown in Figure 1-6 with the zones identified.

Zone 1:
- Bit rate – EXTERNAL
- Sync
- Info Bits – 8 (ASCII = 7)
- Parity – None (ASCII = odd)

Zone 2:
- EIA/Mil to EIA
- Power ON

Zone 3:
- Control EIA to OFF
- TEST MODEM
- MON SIGS OUT TO NORMAL

Zone 5:
- RTS OFF (7x)
- CTS OFF
- DSR OFF
- RLSD OFF
- DTR ON
- RI OFF

Zone 6:
- Counter Input – Duration 8x
- Duration xxx. Milliseconds

Internal Controls: Select 256-step mode (DIP switch 5). The 256-step program mode is indicated by the LEFT-hand decimal for the PAGE display ON.

As supplied, the program controls the modem interface and measures TERMINAL response time. No editing is required for INTERSHAKE to test a remote terminal via a modem.

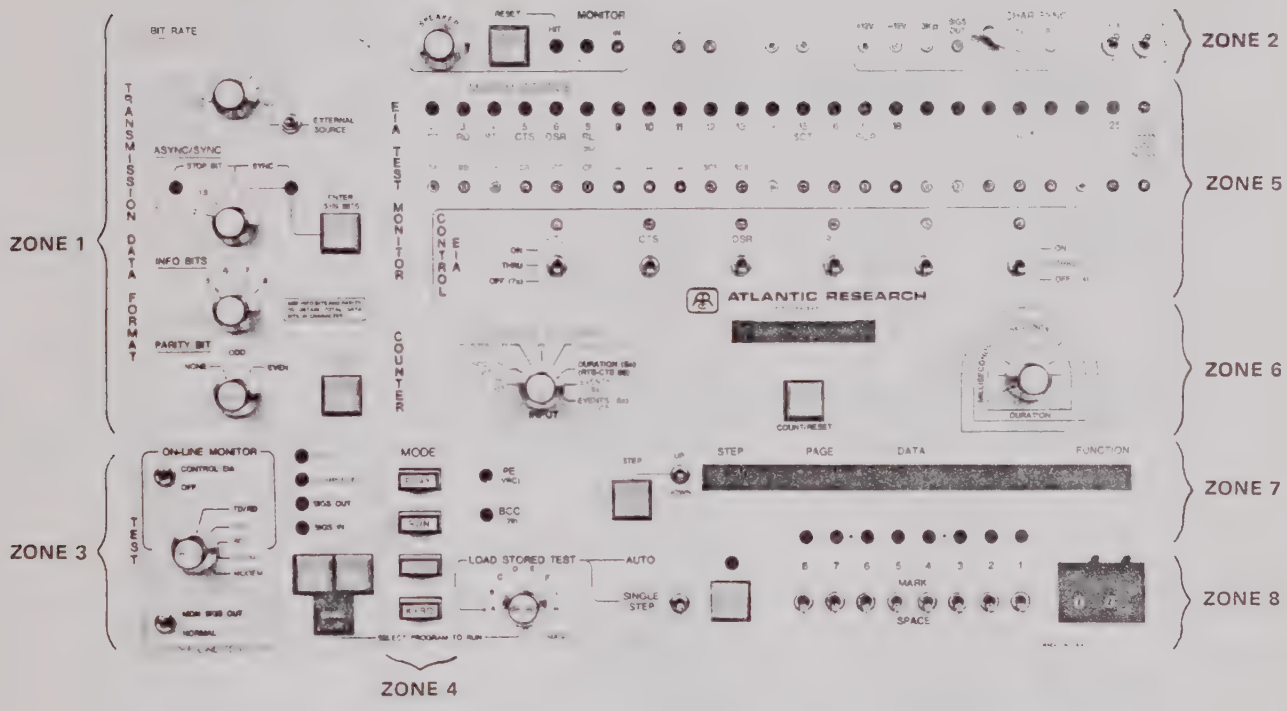
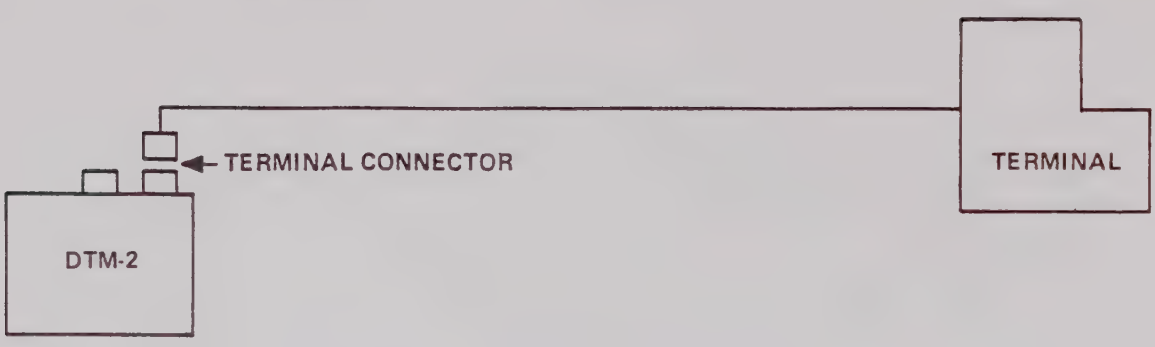


Figure 1-6. INTERSHAKE Panel.

5.4 LOCAL: Test Terminal



Set up the DTM panel controls (see Figure 1-6) as follows:

Zone 1	Bit rate – 4800 (or per system spec) (INTERNAL CLOCK) Sync Info Bits – 8 (ASCII = 7) Parity – None (ASCII = odd)
Zone 2	EIA/Mil to EIA Power – ON
Zone 3	Control EIA to OFF TEST TERMINAL MON SIGS OUT to NORMAL
Zone 5	RTS OFF CTS ON DSR ON RLSD ON DTR OFF RI OFF
Zone 6	Counter Input – Duration (8x) Duration – xxx Milliseconds

Internal Controls: Select 256-step mode (DIP switch 5). The 256-step program is indicated by the LEFT-hand decimal for the PAGE display ON.

NOTE

This program was written for the case in which the DTM-2 is connected directly to a modem. However, when the DTM-2 is interfaced directly to a terminal, the program must be modified by editing the instruction 4072 to 0298, No-Op. (Instruction 4072 is Wait for CTS; CTS only comes from a modem, not a terminal.)

5.4.1 For FDX operation directly connected to the terminal the following program instruction should be edited. As supplied, the program controls the modem interface and measures terminal response time.

AS SUPPLIED				EDIT	
ADRS	DATA	FUN			
16-2 (90)	10	73	Det RLSD OFF	02-98	NO-OP

5.4.2 To simulate SWITCHED CARRIER, some terminals require CTS control as an active signal. The following program instructions should be edited. CTS toggle should also be positioned to OFF (7X)..

ADRS	DATA	FUN		EDIT		
16-2 (90)	10	73	DET RLSD	80	73	DET RTS OFF
17-2 (91)	80	70	RAISE RTS	40	71	DROP CTS
19-2 (93)	40	72	DET CTS	02	98	NO-OP
35-2 (A3)	12	83	12 BITS	30	84	3 SEC INT
37-2 (A5)	30	84	3 SEC	OC	97	ENABLE TIME INT
38-2 (A6)	0C	97	ENABLE INT	80	72	DET RTS ON
39-2 (A7)	80	71	DROP RTS	40	70	RAISE CTS

5.5 Auto Mode

In the auto mode, the DTM operates in an unattended manner once the operator presses START (after setup per Section 5.3 or 5.4).

5.5.1 Operator sequence for the auto mode is outlined in Section 4.0. If the test terminates owing to a fault, the DTM operator may have to "restart" the test. The DTM-2 operator should, however, observe the INTERVIEW CRT display for any abnormalities.

5.5.2 Each transmission sequence is displayed on the INTERVIEW. Transmit is displayed first (low intensity) followed by the receive (normal intensity). Refer to Figures 1-7 and 1-8. Certain characters or groups of characters in the receive messages are reverse imaged to call them to the attention of the operator.

The poll rate of 200 msec may be altered. Refer to Sections 5.6.2 for EDIT CRT and 5.9 for EDIT POLL RATE.

5.5.3 INTERVIEW Setup

HDX/FDX toggle = HDX
CODE = EBCDIC (or ASCII)
FREEZE = RUN
HIGHLIGHT = 00 (or ID to enhance the attribute GS characters)
PAGE = 1 (1 + 2 for message capture)
TOTAL SCREEN = TEXT
CONTROL CHARACTERS = ABBREV

5.5.4 INTERVIEW Display

Figures 1-7 and 1-8 show the characters displayed on the INTERVIEW for the transmit sequences and the receive sequences. Full abbreviations are used in the figures; e.g., EOT, whereas the font actually displays E_T. Each character in these figures is also presented in hexadecimal for both EBCDIC and ASCII.

GENERAL POLL (w/RESET)

	S_Y	S_Y	S_Y	EOT	////	S_Y	S_Y	S_Y	SPA	SPA	II	II	ENQ
EBCDIC	32	32	32	37	FF	32	32	32	/	/	7F	7F	2D
ASCII	16	16	16	04	FF	16	16	16	/	/	A2	A2	85

SPECIFIC POLL (w/RESET)

	S_Y	S_Y	S_Y	EOT	////	S_Y	S_Y	S_Y	SPA	SPA	D_A	D_A	ENQ
EBCDIC	32	32	32	37	FF	32	32	32	/	/	/	/	2D
ASCII	16	16	16	04	FF	16	16	16	/	/	/	/	85

SELECT (w/RESET)

	S_Y	S_Y	S_Y	EOT	////	S_Y	S_Y	S_Y	SSA	SSA	D_A	D_A	ENQ
EBCDIC	32	32	32	37	FF	32	32	32	/	/	/	/	2D
ASCII	16	16	16	04	FF	16	16	16	/	/	/	/	85

RVI

					EBCDIC (SYMBOL)			ASCII
	S_Y	S_Y	S_Y	DLE	@	////	DLE	<
EBCDIC	32	32	32	10	7C	FF		/
ASCII	16	16	16	10	/	FF		BC

Figure 1-7. Transmit Display.

MESSAGE

	S_Y	S_Y	S_Y	STX	. . . . .	ETX	BCC
EBCDIC	32	32	32	02	MESSAGE CONTENTS	03	/
ASCII	16	16	16	02	REFER TO PART II, SECTION 5	03	/

See Note 3, Section 5.5.4

ECHO ENTER

	S_Y	S_Y	S_Y	STX	ESC	5	1	. . . . .	ETX	BCC
EBCDIC	32	32	32	02	27	F5	F1	. . . . .	03	/
ASCII	16	16	16	02	9B	B5	31	. . . . .	03	/

CONTENTS OF 3270 CRT THAT ARE MODIFIED ARE RECEIVED AND STORED IN DTM MEMORY WITH THE ADDRESS OF EACH FIELD.

INDIVIDUAL FIELD ATTRIBUTES ARE NOT ECHO'D.

See Note 3, Section 5.5.4

AID ECHO

	S_Y	S_Y	S_Y	STX	ESC	1	2	GS	/	SP	A	1	D	GS	Z	*	SP	DC3	GS	/	ETX	BCC
EBCDIC	32	32	32	02	27	F1	F2	1D	61	40	C1	C9	C4	1D	E9	/	40	13	1D	61	03	/
ASCII	16	16	16	02	9B	31	32	9D	2F	20	C1	49	C4	9D	DA	/	20	13	9D	2F	03	/

* AID CHARACTER RECEIVED FROM 3270 AND STORED IN DTM MEMORY.

Figure 1-7. (Concluded).

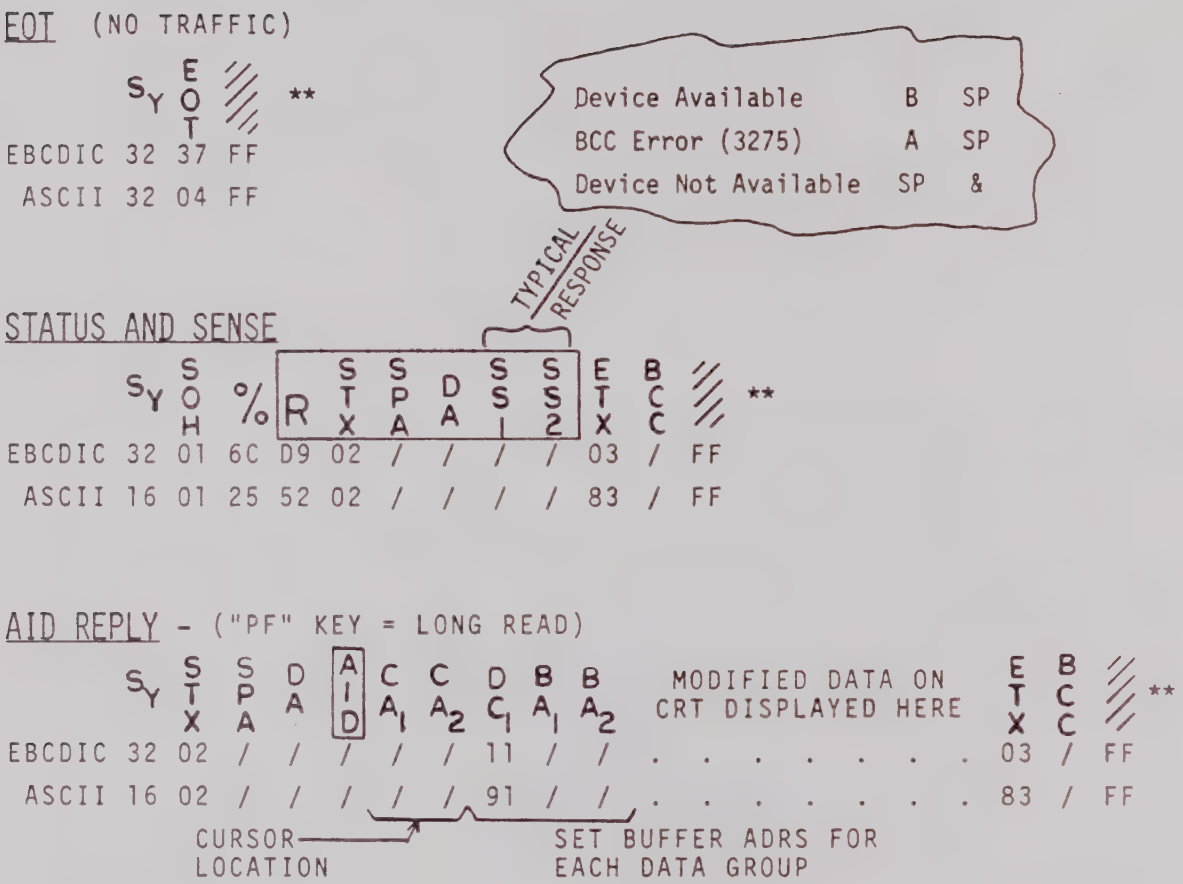


Figure 1-8. Receive Display.

ACK 0

EBCDIC	S_Y	DLE	70	//////	**	
	32	10	70	FF		
ASCII	S_Y	DLE	O	//////	**	
	16	10	B0	FF		

ACK 1

EBCDIC	S_Y	DLE	/	//////	**
	32	10	61	FF	
ASCII	S_Y	DLE	1	//////	**
	16	10	31	FF	

RQTST

	S_Y	SOH	%	/	STX	DCI	BAI	BA2	. . . . .	ETX	BCC	//////	**
EBCDIC	32	01	6C	61	02	11	/	/	. . . . .	03	/	FF	
ASCII	16	01	25	2F	02	91	/	/	. . . . .	83	/	FF	

← EACH MODIFIED FIELD ON CRT →

NAK (3270 ONLY)

	S_Y	NAK	//////	**	
EBCDIC	32	3D	FF		
ASCII	16	15	FF		

** NON PAD characters observed after one or more PAD symbols in the TEST MODEM configuration usually indicates that the receive modem may be strapped for "1-second holdover" or some combinations of "new sync" or "soft carrier turn off." Any pulses observed on the data leads will show up as "garbage characters" and may cause transient operational problems on the system. Normally when the receive signal terminates, RLSD will clamp the Rx lead mark (or in new sync . . . . the clock will be clamped).

Figure 1-8. (Concluded).

NOTES

1. Pad character symbol is shown.

2. Ending Pad on transmit sequences does not display.

3. IGNORE the transmitted BCC. One random character will be displayed after ETX.

4. RECEIVE CHARACTERS ARE BRIGHTER than transmit characters.

5. The first 2 SYNC characters in a RECEIVE sequence are "absorbed" and are not displayed. The sequence shows *one* SY displayed depicting a circuit containing *3* SYNC characters.

6. All transmit characters are displayed (including SYNCS).

7. Reversed characters on the CRT to highlight specific receive sequences are boxed □.

8. The received BCC for EBCDIC is comprised of two characters. The received BCC for ASCII is only one character.

9. Refer to Part II, Section 5.0 for description of the non-protocol character sequences in the message for control of the 3270.

5.6 Interactive Mode

In this mode, operation of the test is a coordinated interaction between the 3270 operator and the DTM operator. For diagnostic purposes, the DTM operator releases each DTM transmission manually and instructs the 3270 operator to perform specific key tasks associated with the fault condition.

5.6.1 Operational sequences outlined in Section 4.0 can be used as a guide; however, the flow chart (Figures 1-1 and 1-5) shows that certain steps can be repeated or deleted to more quickly focus on a problem.

5.6.2 Displayed data will be the same as shown in Section 5.5.4. The data will remain for up to 3 seconds unless the STEP button is operated to release the next transmission. After 3 seconds, the terminal will time-out and initiate an ENQ to which the DTM will respond with a Reset and General Poll.

5.7 Time Measurement

5.7.1 Terminal Response time is measured (as the program is supplied). The measurement begins at the end of the transmit sequence and ends after the first NON-SYNC character that is received. The time, therefore, includes all system parameters: Modem, Ending PAD, leading SYNCs and *one* data character. Exact timing for each transmit sequence is shown in Figure 1-9. Notice that the delay between the last transmit character and activation of RTS is related to the bit rate.

Response time measurements from 10 to 800 msec will be encountered, depending upon the terminal vendor, error checking techniques, buffer transfer method, etc. This is an important system parameter for the user to be aware of.

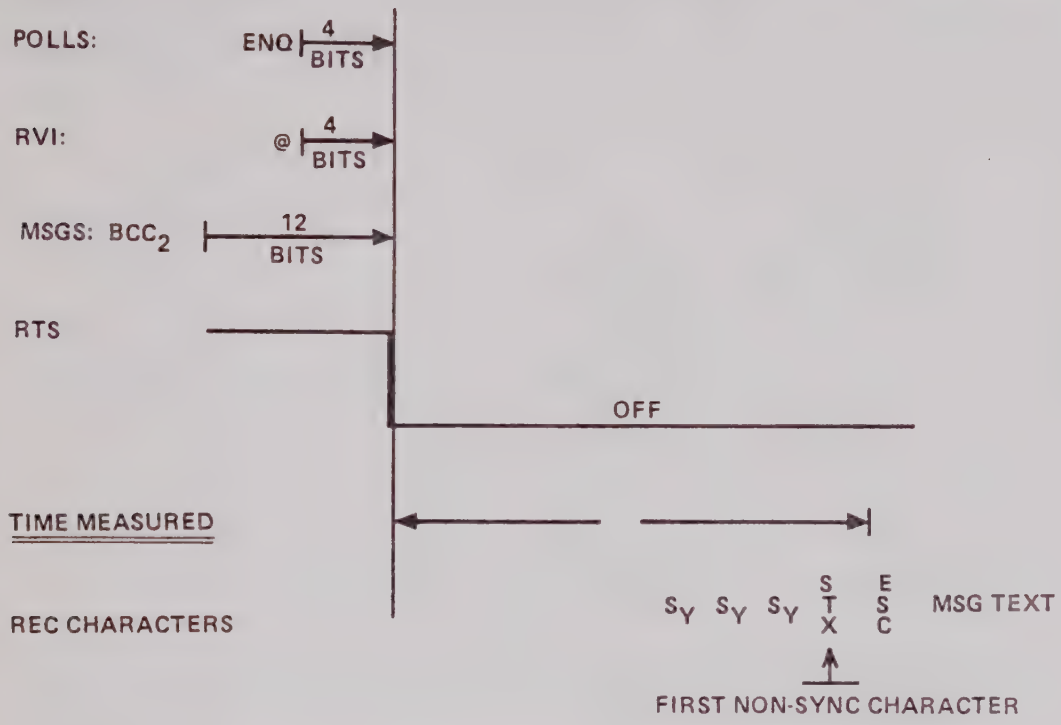


Figure 1-9. Terminal Response-Time Measurement.

5.7.2 RTS-CTS Delay Measurement may be accomplished by editing two steps in the program.

AS SUPPLIED ADRS	DATA	FUN	FOR RTS/CTS TIME EDIT TO		
18-2(92)	02	98	NO-OP	01-87	Start Timer
36-2(A4)	01	87	Start Timer	02-98	NO-OP

- Select counter to Duration (8x)
- Select range to the appropriate delay anticipated, e.g., xxx milliseconds or xx.x milliseconds if the maximum delay is expected to be less than 100 msec.

5.8 Endurance Test

The 3270 test normally returns to a general poll after completion. A simple PASS-FAIL endurance test can be implemented to repeat blocks up to 10^8 times. Only five steps need to be edited to condition the DTM to write a predetermined number of alternating blocks of data to the 3270 and verify the ACK 0, ACK 1 response. An erroneous ACK response will stop the test. Using the front panel counter length switch to select the

number of received ACKs, one can run the endurance test for 10 to 10^8 blocks. For example, the test will stop automatically with END with 10^3 blocks are sent or when an incorrect ACK occurs. Every transmission is included in the block count so that the ENDURANCE test counts the polling transmissions even before the message form and ACK responses begin. To restart the counter to count only ACK responses, operate the counter reset key on the DTM when the message form is echoed.

The program is edited as follows:

	AS SUPPLIED			EDIT/ENTER		
ADRS	DATA		FUN			
18-2 (92)	01	87	(EDITED)	02	98	NO-OP
36-2 (A4)	01	87	(EDITED)	02	98	NO-OP
38-2 (A6)	0C	97	ENABLE INT	0B	97	END = INT
43-2 (AB)	08	97	DISABLE INT	00	85	ADVANCE BASE COUNT
27-3 (DB)	00	41	PRESET	55	41	PRESET ECHO ENTER

To start the endurance test, proceed through the following steps:

1. Set counter to EVENTS IN 10^X.

2. Set counter range to 10^3 and test will stop after 1000 transmissions from the terminal.

3. Start the program running. It should be polling and receiving a response from the terminal being tested.

4. Clear the terminal and perform a TEST REQUEST function.

5. The message form should now appear on the screen. Fill out the form and depress ENTER.

6. The endurance test should now be running.

7. Operate the counter RESET key to begin the count of 10^X blocks (and delete counts of polls).

Displayed during the endurance test will be the ECHO ENTER message (which begins with an *erase/write*) followed by END OF TEST (which begins with a write). The overall result will be a flickering END OF TEST message because it is erased during ECHO ENTER and must wait one Poll Rate delay to be displayed. Visual effects differ according to the poll rate and whether the 3270 is buffered or not. The operator is able to observe that the test is in process — and the keyboard of the 3270 will be locked out.

The terminal must calculate the BCC and check it before the ACK response is generated. This will exercise the terminal logic rather well. Depending upon the manufacturer's design, a variation in reponse time may be observed, since one message is longer than the other.

The endurance test as described terminates at END; however, it could be edited to resume with the general poll.

5.9 Poll Rate

The program is supplied with a 200 ms poll rate. The poll rate is determined by a delay between the last received character and the beginning SYNC character transmitted by the DTM. After the delay, the INTERVIEW CRT is cleared so that the next transmit-receive sequence is displayed. Adjustment of the poll rate is achieved as follows:

AS SUPPLIED ADRS	DATA	FUN		EDIT/ENTER	
13-2(8D)	02	82	200 ms	02-98 30-82 00-00	NO-OP = MIN* DELAY 3 SEC = MAX DELAY Manual Halt

*Total delay is obtained by adding two delays in the program:

ADRS		
11-2(8B)	15 ms	Beep for each transmission
13-2(8D)	— ms	Poll RATE
	15 ms	MINIMUM

The operator may desire to NO-OP all three delays under special test situations to simulate zero turnaround delay by the CPU.

5.10 Program Termination

After the message is echoed back to the 3270 display with END OF TEST, the normal program returns to a general poll and leaves the 3270 keyboard locked out. The test may be repeated by operating the RESET or LOCAL key.

Editing one step can cause the program to terminate with END or automatically alternate two blocks for an ENDURANCE test, as described in Section 5.8.

Terminating the test with END shuts down communication with the terminal in an orderly fashion by sending EOT to the 3270. The 3270 will be inoperable because DTM polling will cease. Restarting the program is accomplished by operating START on the DTM.

5.11 Audible Status Indication

The program may be edited so that after each response to a DTM transmission is received from the 3270, an audible BEEP is produced. It lasts 15 ms and contributes to the delay between receiving the last character of a 3270 message and initiation of the response transmission by the DTM. The volume of the beep is not controlled by the DTM volume control, but its length may be varied.

AS SUPPLIED ADRS	DATA	FUN	EDIT/ENTER
Beep on instruction not entered			Insert instruction 01-70 immediately before Step 11-2(8B).
11-2(8B)	15-80	15 ms	04-80 Tick sound

NOTE: Insertion of instruction 01-70 will cause all steps following to be renumbered.

6.0 REFERENCE DOCUMENTS

6.1 Atlantic Research Corporation Documents

DTM-2 Operator's Manual, OM842A

INTERVIEW Operator's Manual, OM860B

INTERSHAKE II Program Function List Folder, TP-148-3-78.

6.2 Industry Sources

Numerous documents are available covering the BI-SYNC protocol, and other communication techniques. A few of these documents are referenced for the aid of the reader.

General Information – Binary Synchronous Communications IBM # GA27-3004-2

IBM 3270 Information Display System Component Description IBM # GA27-2749-8

Operators Guide for IBM 3270 Information Display Systems IBM # GA27-2742-4

SYSTEM OPERATION FOR SYNCHRONOUS MODEL 40/4 DATA TERMINAL Teletype Corporation, Technical Reference Part 2, Article 7

EIA RS-232

Table 1-1. Edit Options.

AS SUPPLIED ADRS – DATA – FUN	EDIT/ENTER
(FDX)	
TEST MODEM	**TEST TERMINAL**
16-2(90) 10 - 73 DET RLSD OFF Test Modem (Remote) e.g., Switched Carrier	02-90 NO-OP Test Terminal (Local)
Select Test Modem EXT Clock DTR ON RTS OFF (Auto)	Select Test Terminal Select Speed DSR, RLSD ON, CTS ON

(SWITCHED CARRIER)

ADRS	DATA	FUN	EDIT		
16-2 (90)	10	73 DET RLSD	80	73	DET RTS OFF
17-2 (91)	80	70 RAISE RTS	40	71	DROP CTS
19-2 (93)	40	72 DET CTS	02	98	NO-OP
35-2 (A3)	12	83 12 BITS	30	84	3 SEC INT
37-2 (A5)	30	84 3 SEC	0C	97	ENABLE TIME INT
38-2 (A6)	0C	97 ENABLE INT	80	72	DET RTS ON
39-2 (A7)	80	71 DROP RTS	40	70	RAISE CTS

†AUTO MODE	INTERACTIVE MODE
13-2(8D) 02-82 200-ms POLL DELAY = Auto Mode	00 - 00 Halt = Interactive mode. DTM-2 operator releases each DTM-2 transmission manually.
†CONTINUOUS DISPLAY	**CLEAR CRT DISPLAY**
14-2(8E) 02-98 NO-OP for continuous display	01-94 Clears CRT before each DTM-2 transmission.
TIME MEASUREMENT **MEASURE TERMINAL RESPONSE**	**RTS-CTS DELAY**
18-2(92) 02-98 NO-OP	01-87 Start Time RTS - CTS
36-2(A4) 01-87 Start Timer to begin to measure time from last transmitted char to 3270 replay	02-98 NO-OP
†NO BEEP	**AUDIBLE BEEP**
Beep instruction not entered	Insert instruction 01-70 immediately before step 11-2(8B).
11-2(8B) 15-80 15-ms beep indicates end of each transmission received.	04-80 Tick sound

†Revised to reflect firmware program changes.

Table 1-1. (Concluded).

AS SUPPLIED
ADRS – DATA – FUN

EDIT/ENTER

†ENDURANCE TEST

†ENDURANCE TEST

(SWITCHED CARRIER) (Continued)

ADRS	DATA	FUN	EDIT		
18-2 (92)	01	87 (EDITED)	02	98	NO-OP
36-2 (A4)	01	87 (EDITED)	02	98	NO-OP
38-2 (A6)	0C	97 ENABLE INT	0B	97	END = INT
43-2 (AB)	08	97 DISABLE INT	00	85	ADVANCE BASE COUNT
27-3 (DB)	00	41 PRESET	55	41	PRESET ECHO ENTER

– Select Counter to "EVENTS in 10^X" The interrupt on time out is disabled; therefore, the 3 sec. timer is not operable in the DTM. A failure of the 3270 to reply will cause the program to HALT.

– Select Counter Range to 10^3 and test will stop after 10^3 Blocks (longer or shorter tests may be selected 10^N)

†POLL RATE*

VARIABLE RATE

13-2(8D) 02 - 82 Delay ..... prior to DTM-2 transmission = 200 ms

30 - 82 is max delay of 3 sec. between responses, unless interactive mode is selected.

PROGRAM TERMINATION (after "End-of-Test")

ECHO ENTER alternates with END OF TEST

27-3(DB) 00 - 41 Preset ..... to START/GEN POLL

55 - 41 Preset Echo Enter Alternates 2 messages for "Endurance" Test (Checks ACK 0 - ACK 1 Response ... Stop by DTM-2. Keyboard of terminal is locked out)

END

27-3(DB) 00 - 41 Preset ..... to START/GEN POLL

7F - 41 End Terminates Test. DTM-2 Restarts Test.

*For total delay, add the delay at addresses 8B + 8D. (Refer to Section 5.9.)

†Revised to reflect firmware program changes.

PART II

DTM-2 PROGRAM

1.0 FIRMWARE STORED TEST

The INTERSHAKE 3270-Terminal Test Program is available in three stored-test versions: EBCDIC, ASCII, and combined ASCII and EBCDIC. Each option consists of three specific PROMS, E, F, and G, as detailed in Table 2-1.

1.1 Code Options

The EBCDIC option, File D01, applies to terminals using the EBCDIC code only. The written program and hexadecimal printouts are included as Appendix A.

An ASCII version is available as File D02. Although very similar to the EBCDIC version, this test does contain some subtle differences (see Section 3.0). See Appendix B for the written program and hexadecimal printouts.

For the benefit of those who have occasion to test both ASCII and EBCDIC terminals, Files D01 and D02 have been combined in a single option, D03: both the ASCII and EBCDIC versions of the 3270 program have been incorporated into a single PROM series. (See Appendix C.) File D03 may be obtained with either of two message forms: one for the 3270-series tests and one (on another PROM) specifically written for testing the Data Speed 40/4. Appendix C also includes the message form content for this option.

Table 2-2 lists the locations of test messages on the G PROMs of all three files.

Users who have the standard DTM-2 PROM set, File D04, can use it for EBCDIC applications if they supplement it with an 002 Message PROM.

For quick reference, the PROMs containing the 3270 Test are mapped in Figure 2-1.

1.2 Ordering Information

Refer to Tables 2-1 and 2-2 before ordering. Orders should specify File Number, Test (3270, 40/4), and whether EBCDIC, ASCII, or both is wanted. If a single PROM is needed for any reason, give the above information plus the designation E, F, or G.

2.0 PROGRAM DESCRIPTION

The DTM 3270-Test program consists of several program modules. Each program module treats a specific part of the protocol. There are two major types of modules: Receive and Transmit.

The key to this program is that all received signals are first processed by the REC Module. After the REC module identifies the type of message being received, two further decisions are performed:

Table 2-1. 3270-Terminal Firmware Stored-Test Options.

	EBCDIC 3270-Terminal Test	ASCII 3270-Terminal Test	Combined ASCII and EBCDIC 3270-Terminal Tests	Standard Product Comb. Tests with EBCDIC 3270-Terminal Test
File Number	File D01	File D02	File D03	File D04
Data PROM	842E-001	842E-002	842E-003	842E-004
Function PROM	842F-001	842F-002	842F-003	842F-004
Message PROM	842G-002	842G-003	842G-004 (3270) 842G-006 (40/4)	842G-001*
Ref. Documents	SI-842-2	SI-842-2	SI-842-2	SI-842-3
Release Date	10-1-77	2-7-78	2-10-78	2-10-78
DTM E,F-PROM Cell	G/H	G/H	E/F (ASCII), G/H (EBCDIC)	G/H

*To test a 3270-type terminal with File D04, an 842G-002 PROM should be ordered.

Table 2-2. Locations of Test Messages on G PROMs.

FUNCTION	842G-001A (Standard)†	842G-002B (EBCDIC 3270)	842G-003A (ASCII 3270)	842G-004 (ASCII and EBCDIC 3270)	842G-006 (ASCII and EBCDIC 40/4)
60	ASCII Fox Message 72 chars.	ASCII Fox Message 72 chars.	ASCII Fox Message 72 chars.	ASCII 3270-Terminal Test Message Pt. 1	ASCII 40/4-Terminal Test Message Pt. 1
61	ASCII Test Message 82 chars.	ASCII Test Message 80 chars.	ASCII Test Message 80 chars.	ASCII Test Message 80 chars.	ASCII Test Message 80 chars.
62	ASCII Test Message 122 chars.	ASCII Test Message 122 chars.	ASCII Test Message 122 chars.	ASCII Test Message 122 chars.	ASCII Test Message 122 chars
63	EBCDIC Test Message 80 chars.	EBCDIC Test Message 80 chars.	EBCDIC Test Message 80 chars.	EBCDIC Test Message 80 chars.	EBCDIC Test Message 80 chars.
64	EBCDIC Test Message 122 chars.	EBCDIC Test Message 122 chars.	EBCDIC Test Message 122 chars	EBCDIC Test Message 122 chars.	EBCDIC Test Message 122 chars.
65	EBCD Test Message 122 chars	EBCD Test Message 122 chars	EBCD Test Message 122 chars.	ASCII 3270-Terminal Test Message Pt. 2	ASCII 40/4-Terminal Test Message Pt. 2
66	Selectric Test Message 122 chars.	EBCDIC 3270-Terminal Test Message Pt. 1	ASCII 3270-Terminal Test Message Pt. 1	EBCDIC 3270-Terminal Test Message Pt. 1	EBCDIC 40/4-Terminal Test Message Pt. 1
67	Baudot Fox Message 72/77	EBCDIC 3270-Terminal Test Message Pt. 2	ASCII 3270-Terminal Test Message Pt. 2	EBCDIC 3270-Terminal Test Message Pt. 2	EBCDIC 40/4-Terminal Test Message Pt. 2

†This PROM is included for reference purposes only.

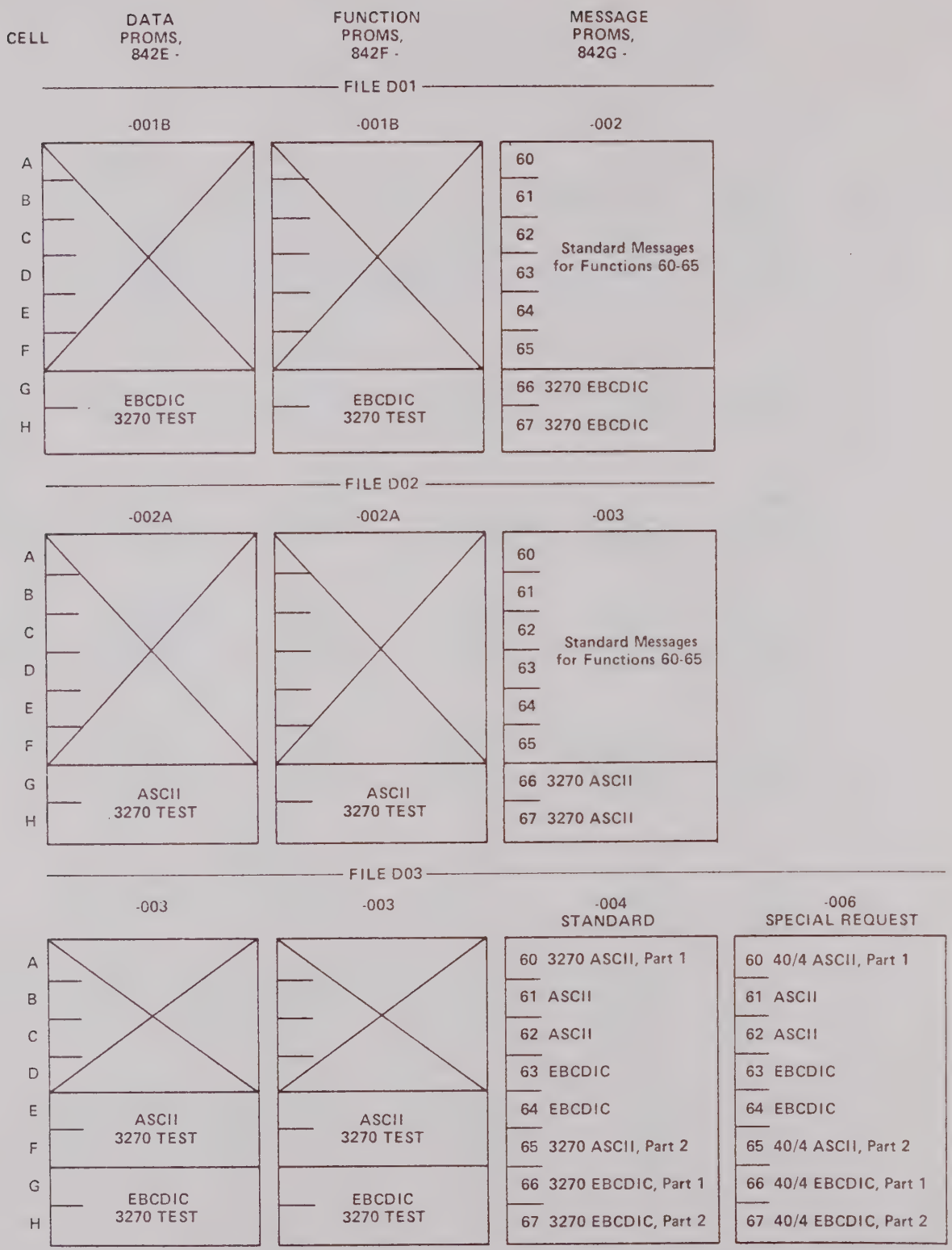


Figure 2-1. Map of Contents of PROMs in Files D01, D02, and D03.

a. Is this the correct response to the last transmitted message?

b. What is the *next* transmitted message to respond to this received message?

A second important ingredient in the program is a transmit subroutine which contains all the "housekeeping" chores to control the RS-232 interface modem, INTERVIEW CRT, time delay measurements, polling delays and operator interaction. This subroutine is common to (precedes) all transmit sequences and includes SYNC characters, etc.

A third basic concept is that, since all transmit modules are followed by the REC module, the factors normally considered "transmit shut down" can be assigned to the REC module. These features, delay after the last transmit character prior to controlling the RS-232 interface leads, time delay measurements, INTERVIEW CRT control, etc., occur only once . . . . in the REC module.

3.0 PROGRAM MODULES

Figure 2-2 is a program module flow chart showing the linkages of the major program modules relative to their inputs and outputs. JUMP instructions are used to direct the program flow between these modules.

This technique of using modules substantially simplifies the understanding (and writing/debugging) of otherwise complex programs. Each module is written as a stand-alone program and is then incorporated into the overall program as determined by Figure 2-2.

How big a module should be depends upon the purpose of the module. Note that the REC module in Figure 2-2 generates several outputs directly controlling send modules. There is, however, further processing of the DLE by the ACK module and further processing of SOH and STX by the S&S and AID module. Generally a module should have a defined input (or two) and a well-defined exit point (or several outputs).

Comparison of the program module flow chart in Figure 2-2 with the interactive flow diagram in Figure 2-3 will reveal a similarity. Figure 2-2 is oriented toward the program in the DTM and Figure 2-3 concerns use of the DTM program to generate the protocol sequence required by the 3270 terminal.

A further study of the individual program modules will indicate the sequential protocol criteria for decisions that are not labeled in Figure 2-2, but are implied in Figure 2-3.

Figure 2-4 shows the flow chart symbols used in the program modules. There are four major program components: (1) input/output, (2) actions, (3) conditional tests/JUMPS, (4) subroutines.

3.1 Receive Modules

There are three receive modules. Figure 2-5 shows the REC module which is basic to the entire program concept. Note that there are a number of actions related to terminating the transmit operation prior to actually beginning to receive data. Processing of EOT depends upon the status of the S&S flag.

Figure 2-6 shows the ACK module. This is perhaps the most complex module, since it both tests for a valid ACK 1-0 sequence and also determines where in the operational sequence (Figure 2-3) the program is.

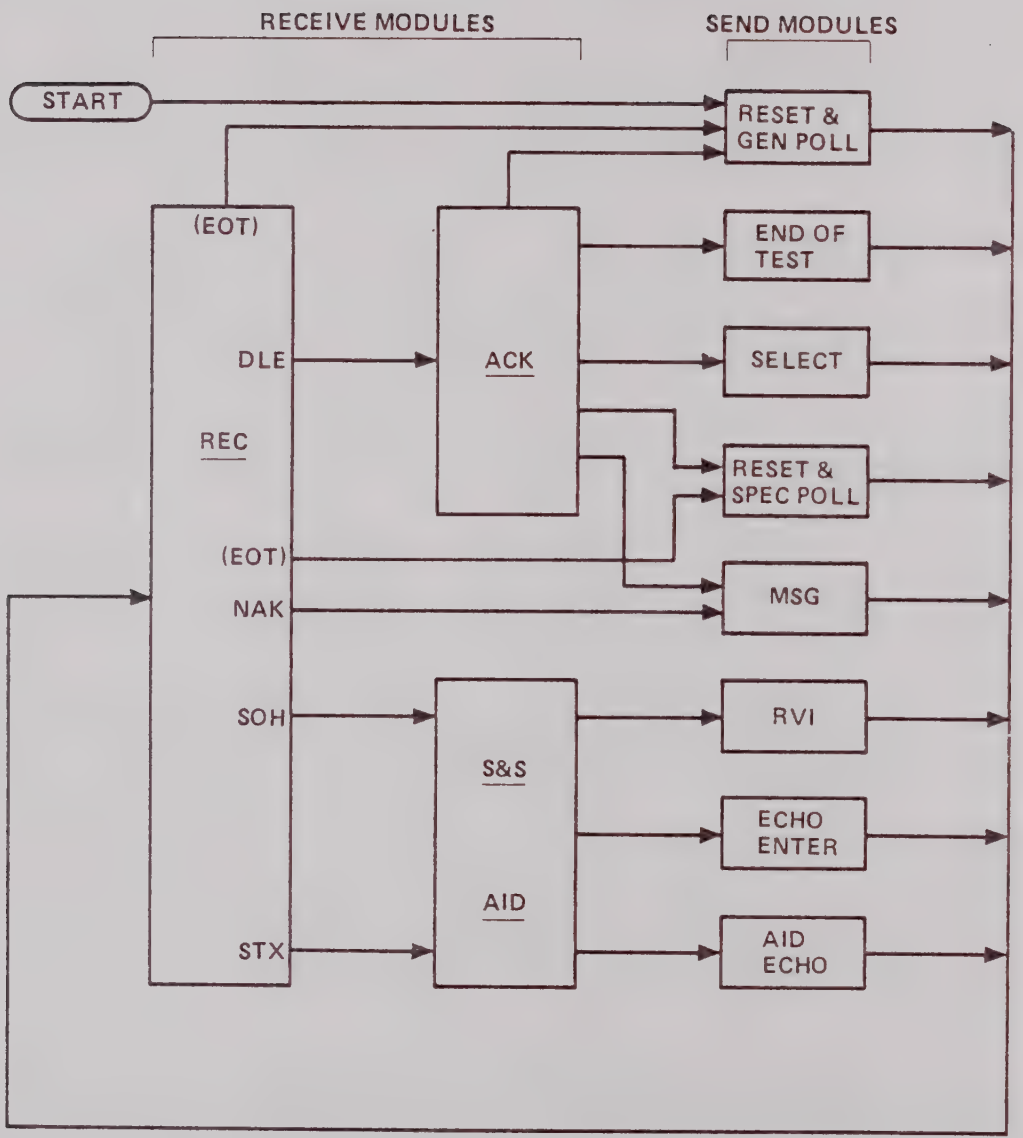
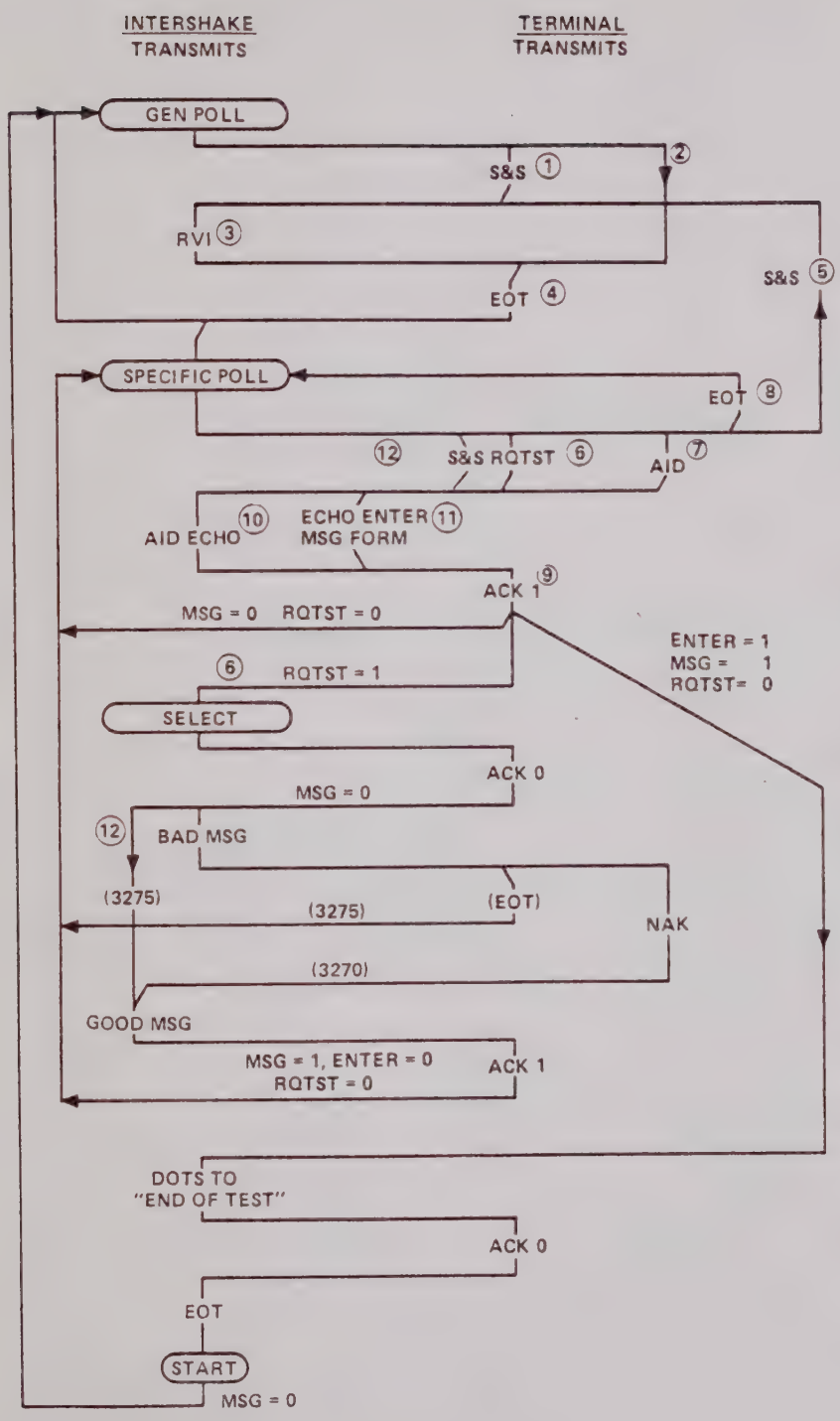


Figure 2-2. Program Module Flow Chart.



NOTES

1. ON POWER UP.
2. NO PENDING S&S.
3. RESETS S&S.
4. RESPONSIVE TO RVI.
5. ERROR RESPONSIVE. (S&S PENDING)
6. RQTST KEY OPERATED.
7. ANY OTHER AID KEY OPERATED.
8. NO TRAFFIC.
9. ACK 1 RESPONSE SINCE AID/RQTST RESPONSE GEN POLL EQUALLED ACK 0.
10. ECHO ANY AID KEY AND "ENTER" ON TO FORM BAD CRC E.G. STATUS LED WAS ON.
11. ECHO "ENTERED" DATA ON GOOD FORM.
12. 3275 AFTER BAD MSG HAS BEEN SENT.
13. AFTER GOOD MSG HAS BEEN SENT (AND ACK 1 RCVD).

FLAG STATUS

START SETS ALL FLAGS TO "0"

RQTST: SET 0 ON SEND ENQ
SET 1 ON REC RQTST

BAD MSG TOGGLES: "0" FOR BAD MSG

MSG: 0 = SELECT GEN POLL.
1 = GOOD MSG

ENTER FLAG: 0 → SEND ENQ
1 → REC ENTER

S&S: 0 ON SEND ENQ
1 ON REC S&S

Figure 2-3. Interactive Flow Diagram.

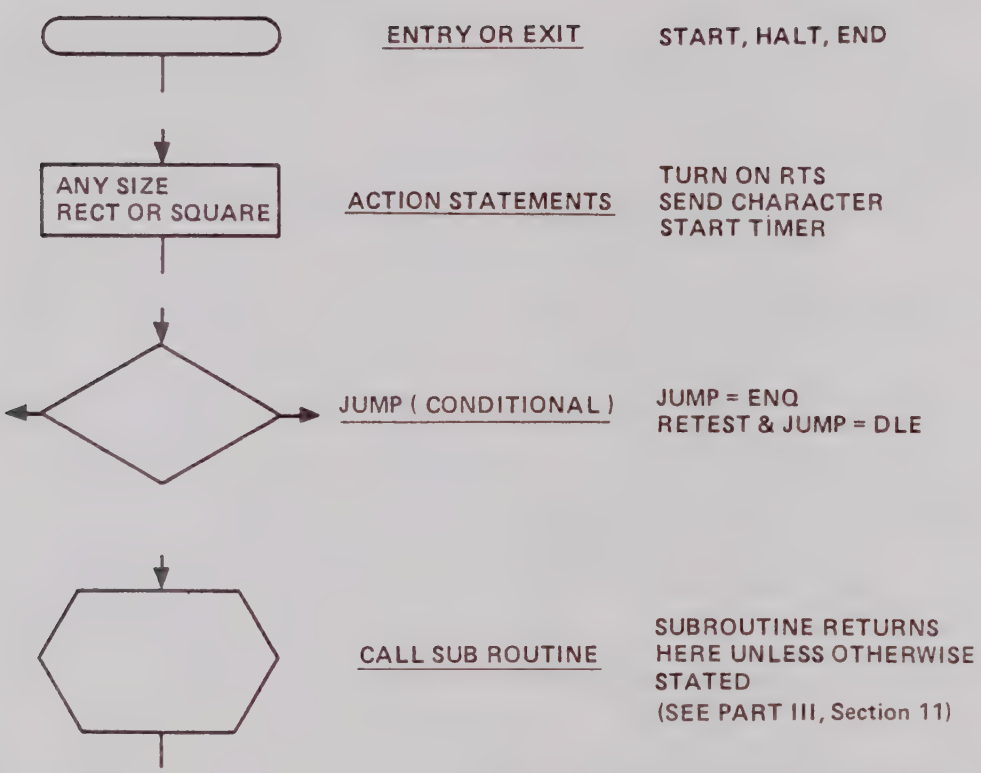


Figure 2-4. Intershake Program Flow Chart Symbols.

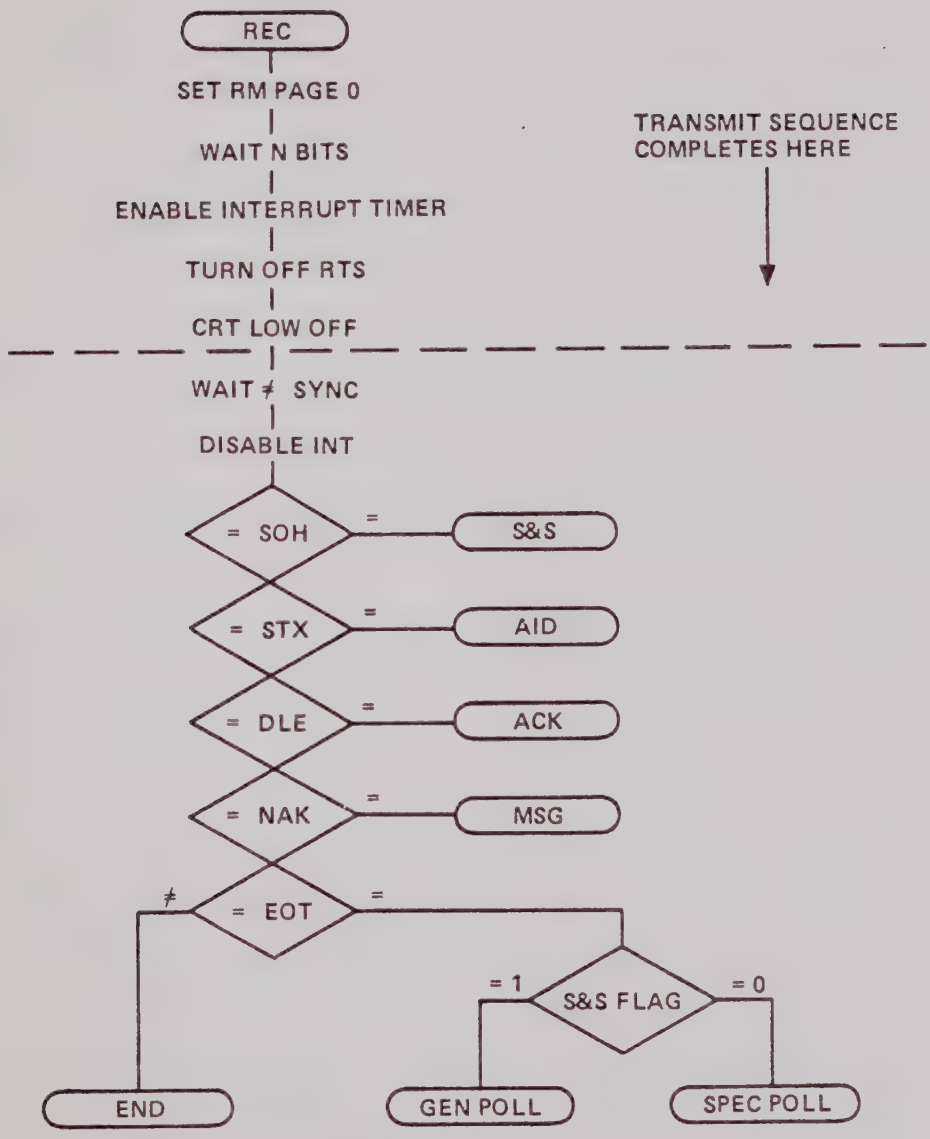


Figure 2-5. REC Module.

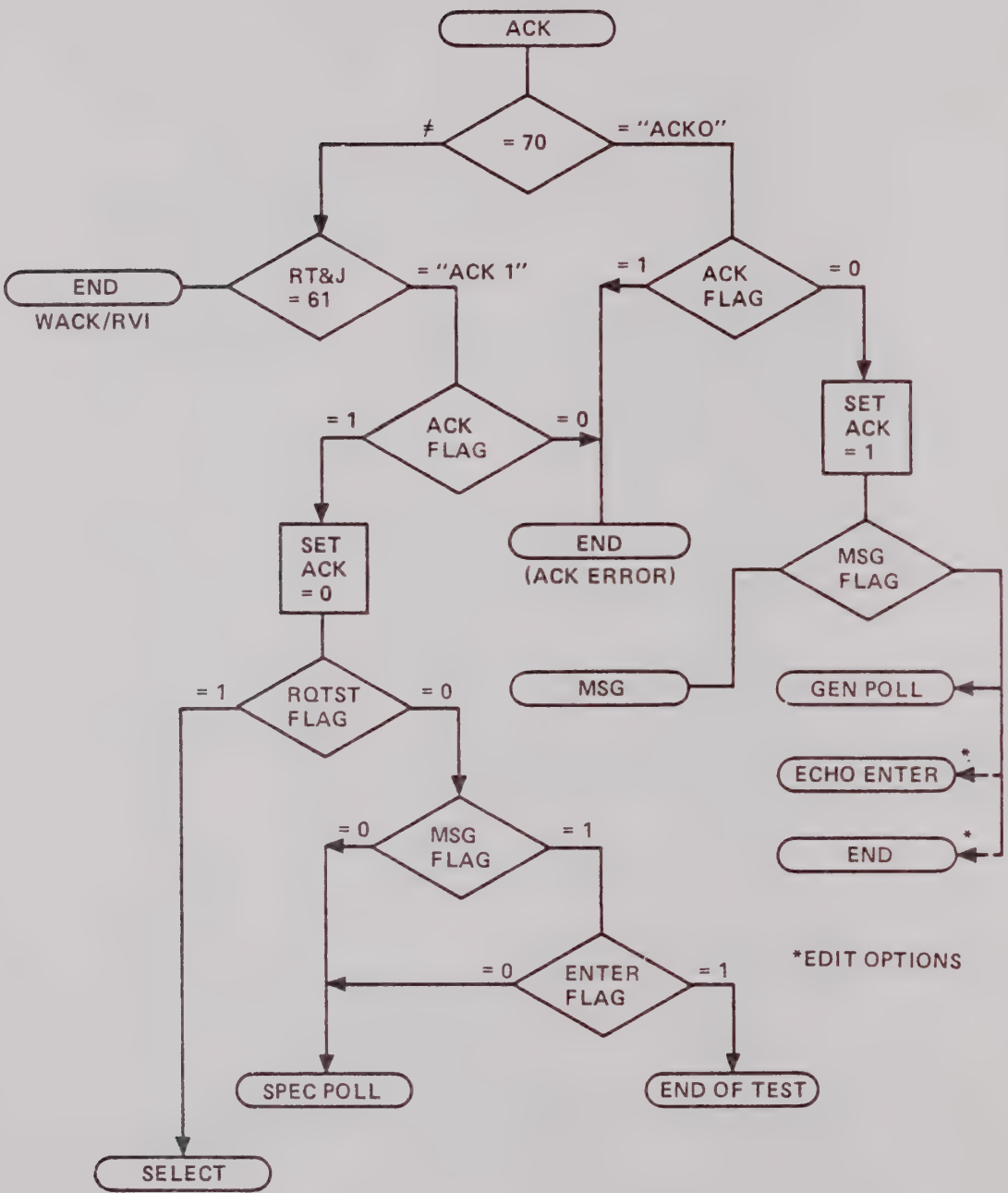


Figure 2-6. ACK Module.

One of the prime features of the DTM-2 is the availability of 8 flags. These flags are set to "1" or "0" at various stages of the program and can be tested at any time to determine whether an action has or has not been previously taken.

Note that the termination of the test (right most path) can be edited from the General Poll to Echo Enter or END as shown by the dotted lines.

Figure 2-7 shows the S&S and AID module. This is really two modules; however, they share many common features and are joined to conserve program steps.

The S&S path sets flags denoting S&S or RQTST and causes the INTERVIEW to display a reverse image to emphasize this important character sequence for the operator.

The AID path and RQTST logs the AID character into a predetermined location of Results Memory so that the same character received from the 3270 will be echoed back to the 3270.

The ENTER aid must also be flagged to properly echo the data manually entered in the message form on the 3270. Figure 2-6 shows the ACK 1 path testing the ENTER flag so END OF TEST can be generated.

3.2 Transmit Modules

There are 8 basic transmit (or "send") modules. The Start TX subroutine and END modules do not show up on the overall program module flow chart in Figure 2-2 because they are common to many segments of the program.

Figure 2-8 shows the START TX subroutine. This subroutine is used for all transmit modules. All start-up controls are included in this subroutine for RS-232 control, time delay measurements, INTERVIEW CRT control, audible alert to the operator that a message was received, and operator interaction, e.g., HALT and poll rate. Most of the EDITING for various features is performed in this part of the program.

START TX has the primary function of generating 3 SYNC characters that start each transmission.

The capability to lengthen the subroutine is included (e.g., chain onto it another sequence of characters to be transmitted). Testing the R (return) flag permits the RESET sequence used by General Poll, Specific Poll and the Select sequence to be added to the start TX subroutine only when needed.

Figure 2-9 shows the modules that require the 3270 address characters. This chart indicates how like portions of transmit programs can be shared to reduce program steps.

After the ENQ, a number of flags are initialized. The receive modules may then test these flags for status (e.g., was the last transmission an ENQ . . . . . and which one?).

Figure 2-10 shows generation of messages having textual content.

An important feature is the alternating Good and Bad BCCs sent with the message form to the 3270 at the request of the RQTST key. The E (error) flag keeps track of the good or bad status of the BCC.

Several steps are saved in the program by sharing ETX and BCC.

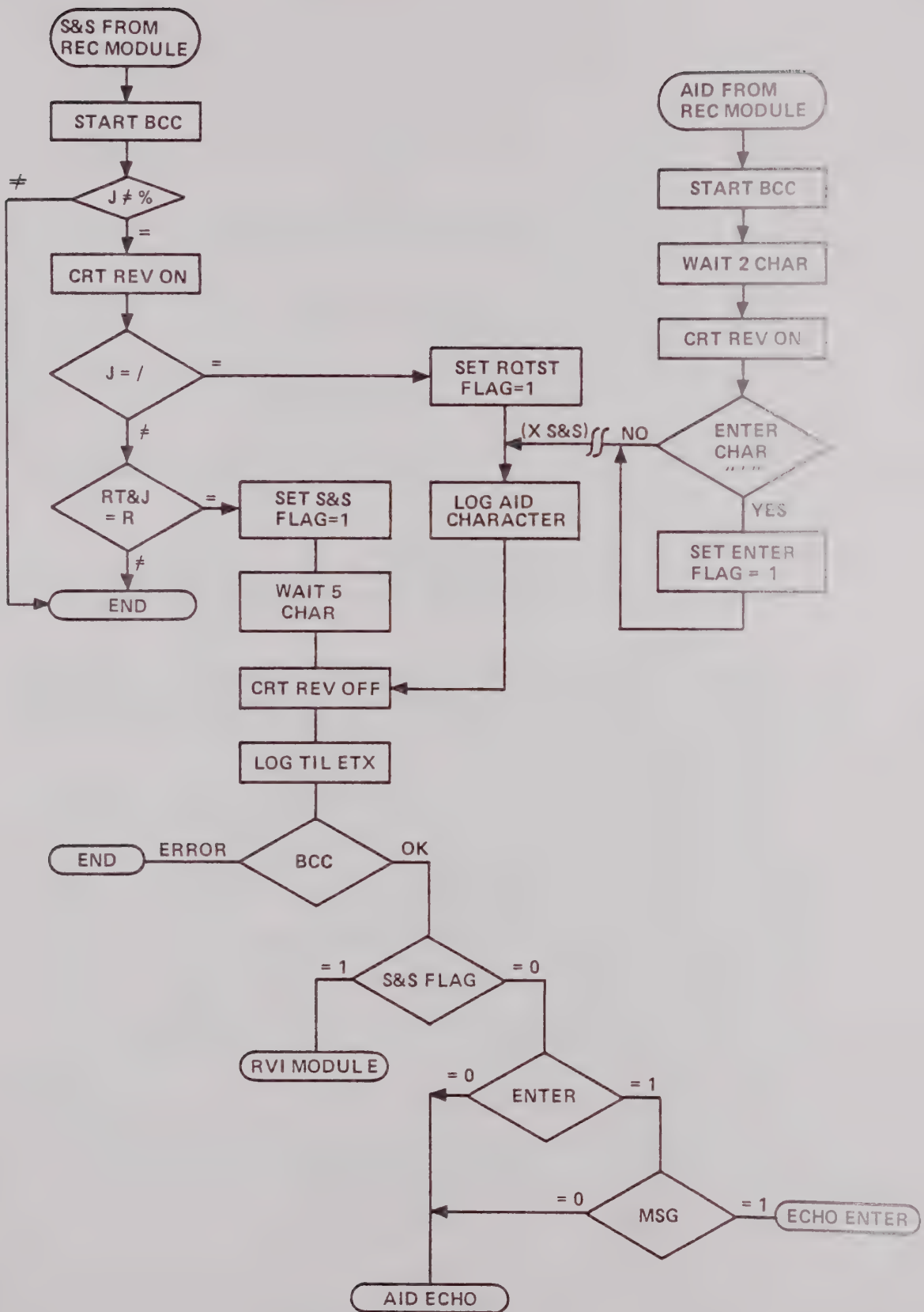


Figure 2-7. S&S and AID Module.

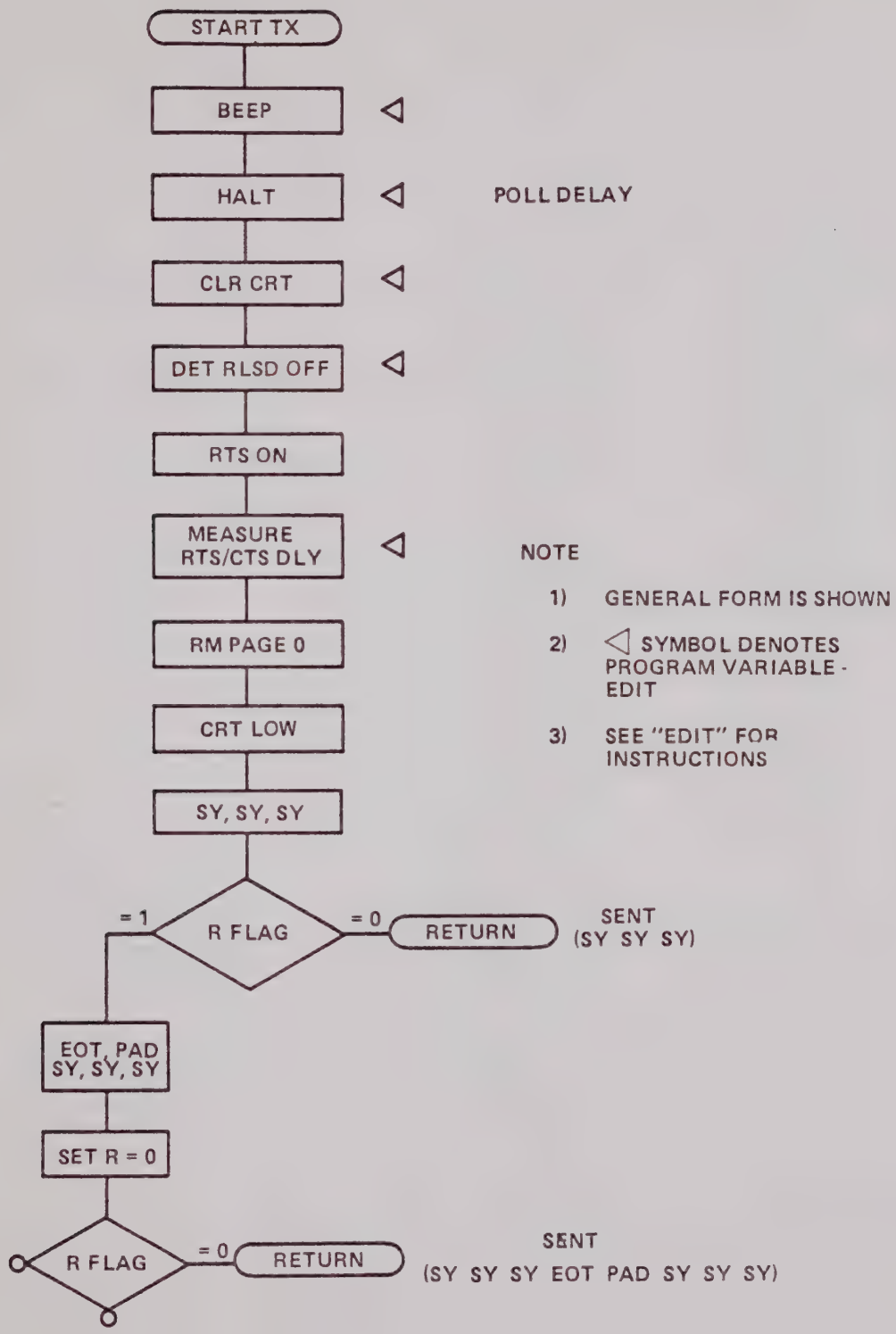


Figure 2-8. Send Module: Start TX (Subroutine).

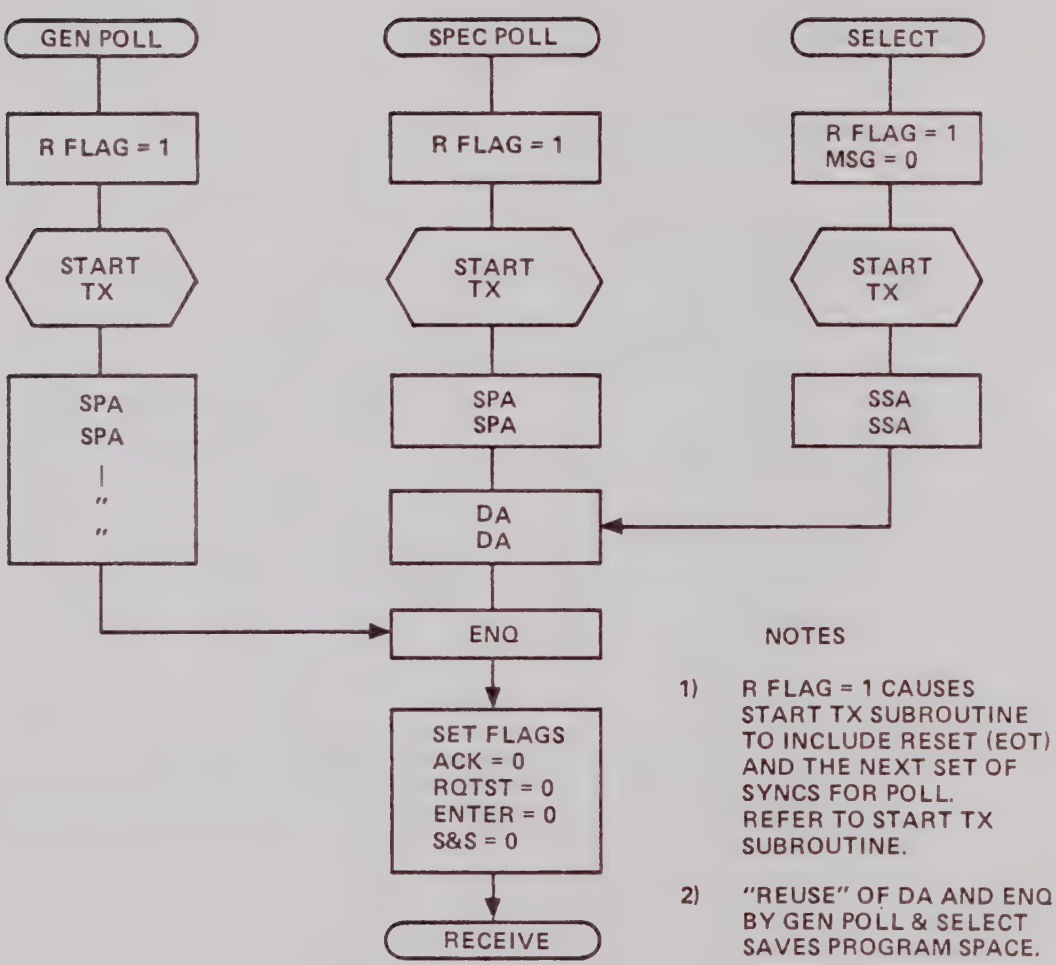


Figure 2-9. Send Poll & Select Modules.

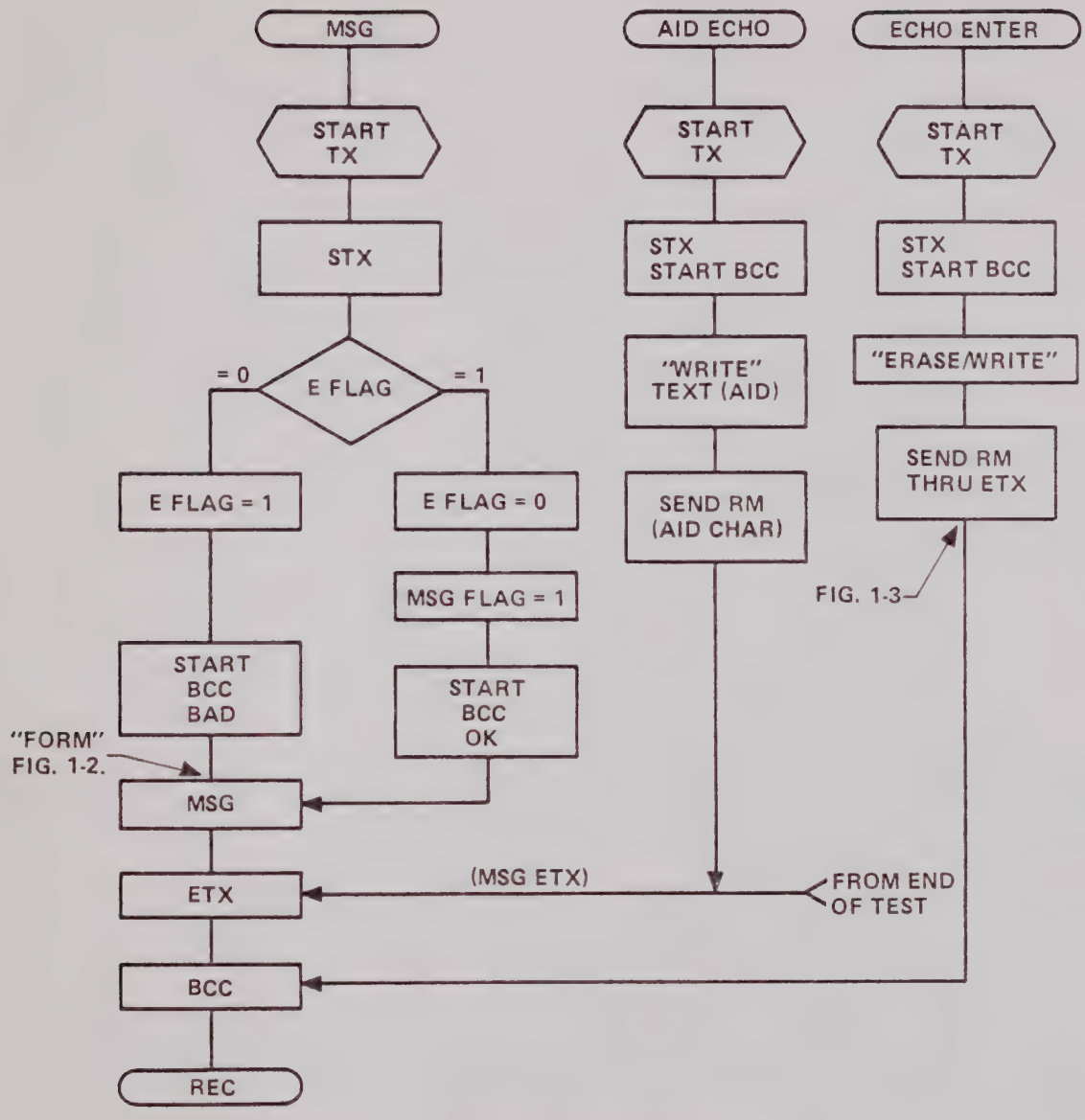


Figure 2-10. Send Modules: MSG, AID, ENTER.

Figure 2-11 shows the three "canned" responses: RVI, END OF TEST, and END. END sends EOT to reset the 3270, then shuts down the DTM operation, leaving the INTERVIEW display showing the last transmit/receive sequence.

3.3 Module Linkages

The program includes several smaller program modules. Table 2-3 includes receive, transmit, and other modules to describe the overall character of the program. The table also shows important characteristics of each module, such as the following:

- Starting address (in hexadecimal since jumps use the hexadecimal address).
- Module size (to show during program development how big the overall program is . . . . and where to place the module in the overall program).
- Exit (what other modules the program may jump to as it continues operation).
- SET flags (which flags are set in the module).
- TEST flags (which flags are tested in the module).

4.0 FORMS IN WHICH PROGRAM IS AVAILABLE

4.1 Program Sheets

The EBCDIC and ASCII programs are printed on INTERSHAKE program sheets in Appendices A and B.

EDIT DATA or FUNCTIONS are in parentheses for ease of identification. Successive program modules are separated by heavy horizontal lines and each module is titled within a circle near the right-hand JUMP arrow column. For convenience all addresses that are used as destinations for Jumps are circled. Major program features are listed under comments.

There are only two differences between the EBCDIC and ASCII programs: (1) code for characters and (2) BCC. Functions 38, 39, 58 and 59 are related to the BCC change from CRC (EBCDIC) to LRC (ASCII). Fill characters are not required for LRC and are deleted in ASCII.

For ASCII, the program is set up for ODD parity characters and EVEN LRC. The program checks for Parity errors as well as for LRC errors on all transmissions. A parity error will register on the PE LED but will be counted only if the counter is manually selected to PE in 10^X and the timer Functions 87 are edited to NO-OP (at hexadecimal address 92, A4).

This test is contained in a 256-step program cell. Fourteen steps are unused and are available for special purposes the user may define. For example, the results memory contents may be transmitted to a printer – e.g., ASCII at 110 baud using code conversion from EBCDIC. The test record that would be available at both the DTM and 3270 site (if the latter is so equipped) is shown in Figure 1-3. This exercise is left to the user.

Figures 2-12 and 2-13 show the program listing as displayed on the INTERVIEW.

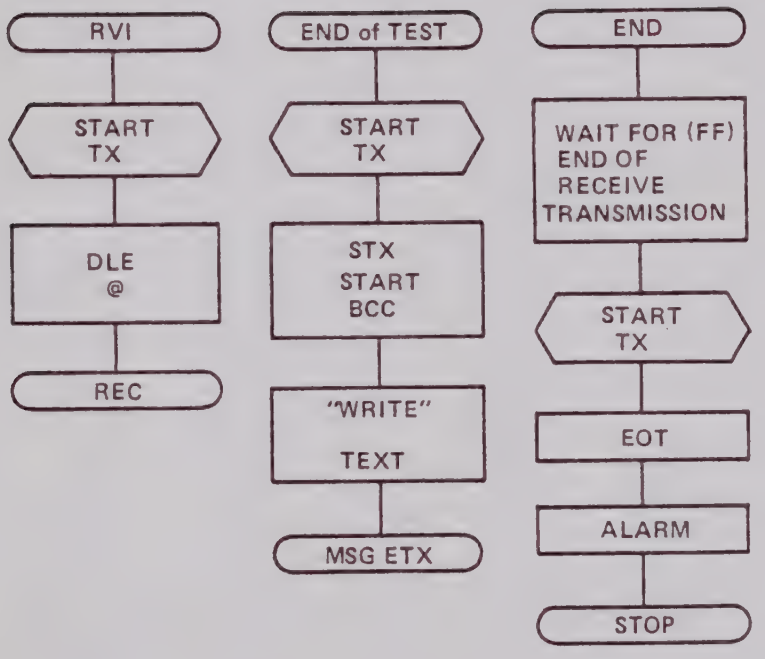


Figure 2-11. Send Modules: RVI, END OF TEST, END.

END OF TEST

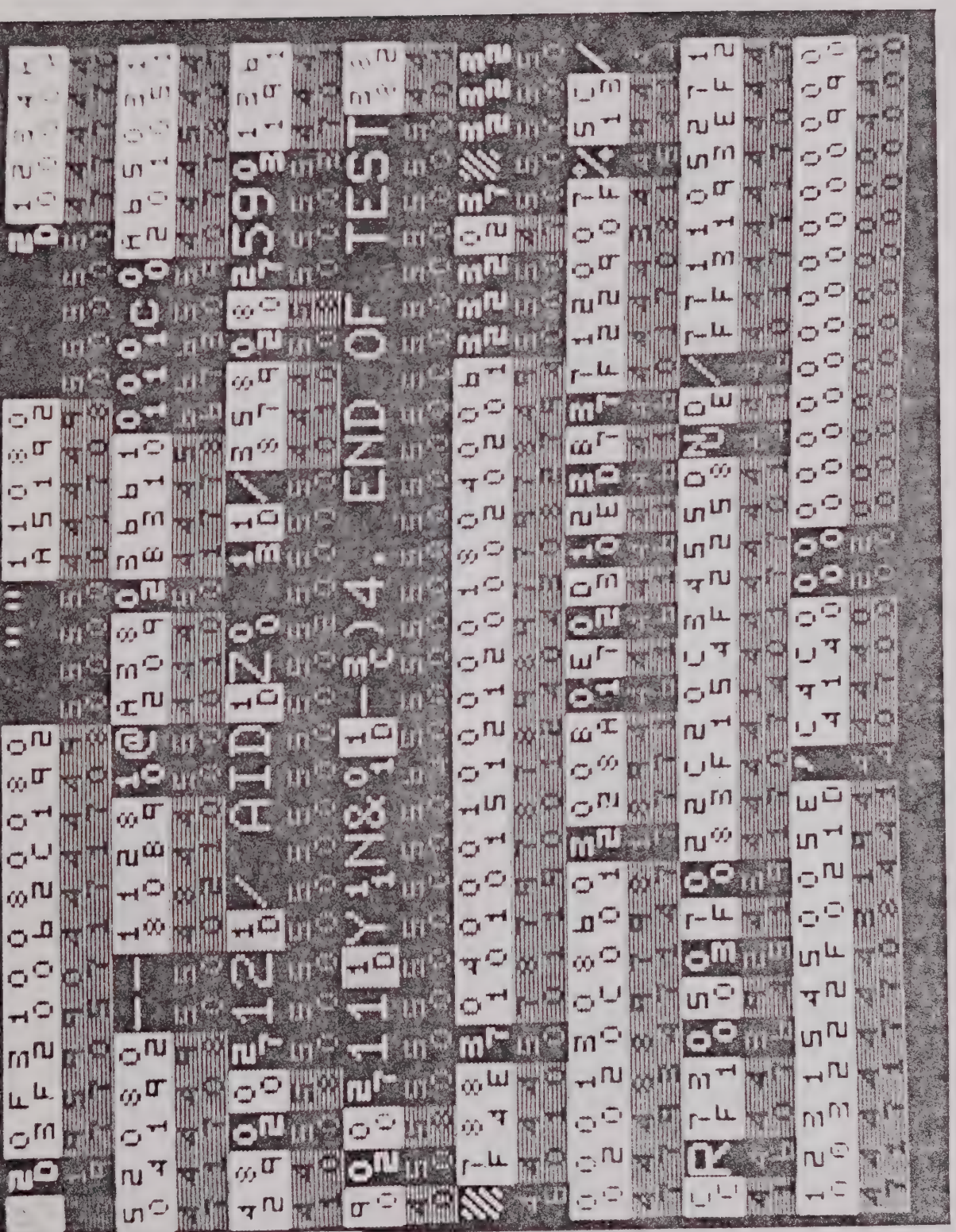


Figure 2-13. Program Listing on INTERVIEW with Control Characters in Hexadecimal.

Table 2-3. Program Modules, Linkages, ADRS, Flags.

Start ADRS	Title	# Steps	Exit	Set Flags	Test Flags
1. SEND/TRANSMIT					
09	Reset & Gen Poll	9	REC	*	—
12	Reset & Specific Poll	14	REC	*	—
20	Reset & Select	8	REC	* MSG = 0	—
28	RVI	5	REC	—	—
2E	MSG	17	REC	E Toggles Good MSG = 1	E
3F	Aid Echo	21	MSG ETX	—	—
55	Echo Enter	9	MSG BCC	—	—
5F	End of Test	24	MSG ETX	—	—
7F	End	10	Stop	—	—
89	Start TX (Subroutine)	28	(Return)	R Flag = 0	R
2. RECEIVE					
A2	Receive	25	S&S, AID, ACK MSG, GEN POLL, SPEC POLL	—	S&S
BA	S&S	24	RVI, AID ECHO, ECHO ENTER	RQTST = 1 S&S = 1	S&S
E7	AID	8	S&S	Enter = 1	
D3	ACK	20	SELECT, SPEC POLL END OF TEST, MSG, GEN POLL/ECHO/END	ACK = 1 ACK = 0	ACK, RQTST MSG, ENTER
3. MISC.					
00	Start Up	9	GEN POLL	MSG = 0	—
FD	Interrupt Service	3	GEN POLL, START	—	—

*Flags Set

RQTST = 0, Return = 0, Enter = 0, S&S = 0, R Flag = 1

4.2 INTERVIEW Display

Figures 2-12 and 2-13 show the INTERVIEW display of the INTERSHAKE EBCDIC program in the LOAD mode. A horizontal presentation permits the text to be read directly. Program characteristics are easily seen.

a. One line on the CRT is 32 steps, which correspond to one side of an INTERSHAKE program sheet. (See Appendix A or B for a sample.) All 256 steps are displayed on the CRT.

b. The top and odd lines contain the data and the low-intensity, even lines show the corresponding functions. Step 01 contains Data 2D and Function 19 (see Figure 2-13).

c. Steps that contain data transmission character-oriented functions are normal (white on black). 2D in Step 01 is directing the receiver to look for an ENQ character.

d. NON-data- or non-character-oriented functions are displayed in reverse image (black on white). Step 31 is a JUMP instruction, Function 40, to Address A2.

e. The Highlight switch is set to 1D (hex) to visually identify all GS (start attribute field) characters in the program. The Highlight switch could also enable the operator to see every step in which a specific function is used in the program.

f. All control characters can be easily accentuated by operating the "control characters = HEX" toggle on the INTERVIEW. Figure 2-13 shows control characters in hexadecimal. Note that SY (SYNC) and GS in Figure 2-12 changed to 32 and 1D in Figure 2-13.

4.3 Inter-KEY Printout

With Inter-KEY, the INTERSHAKE EBCDIC program may be printed on any ASCII ASYNC printer. Figure 2-14 shows a typical printout with the title manually entered. This program example has an Identifier character G preceding the g (Go) header character. This identifier is assigned to assist in retrieval of a specific program from a tape file containing many programs.

A number of important characteristics should be noted:

a. Each column contains 64 steps corresponding to one standard INTERSHAKE program sheet.

b. The three-character mnemonics assist the reader in recognizing the functions.

c. Each column is separated into groups of 8 steps to facilitate locating and counting steps.

d. Four columns correspond to four program sheets or a full-cell test of 256 steps.

e. An entire 256-step program will fit on a single 8½" X 11" sheet of paper for ease of filing.

```
Gg
5047 FLG  4241 PRE  FF46 RTJ  6144 JEC
2D19 INT  8940 JMP  7F40 JMP  CD41 PRE
0397 INT  0250 XMT  8441 PRE  D946 RTJ
FF57 xmt  0058 BCC  8F40 JMP  7F40 JMP
3290 SYN  2750 XMT  3750 XMT  3147 FLG
1095 SYN  F150 XMT  0298 nop  0036 REC
0007 BSW  F250 XMT  4081 DLY  5094 AUX
0e41 PRE  1D50 XMT  0171 232  0325 REC

8247 JFG  6150 XMT  0099 END  7F41 PRE
0C41 PRE  4050 XMT  0298 nop  0039 JBE
0147 FLG  C150 XMT  1095 SYN  2841 PRE
8940 JMP  C950 XMT  1580 DLY  2347 JFG
0298 nop  C450 XMT  0171 232  D040 JMP
4050 XMT  1D50 XMT  0282 DLY  2147 FLG
4050 XMT  E950 XMT  0298 nop  0514 REC
7F50 XMT  0052 xMT  0280 DLY  C540 JMP

7F50 XMT  4050 XMT  0094 AUX  3F41 PRE
1A40 JMP  1350 XMT  1073 232  4247 JFG
1541 PRE  1D50 XMT  8070 232  5247 JFG
0147 FLG  C150 XMT  0298 nop  5540 JMP
8940 JMP  3840 JMP  4072 232  D941 PRE
0298 nop  5741 PRE  0287 CTR  7044 JEC
4050 XMT  8940 JMP  0049 -RM  DF41 PRE
4050 XMT  0250 XMT  6194 AUX  6146 RTJ

4050 XMT  0058 BCC  3250 XMT  7F40 JMP
4050 XMT  2750 XMT  3250 XMT  7F41 PRE
2D50 XMT  F550 XMT  3250 XMT  1347 JFG
1047 FLG  F150 XMT  0247 JFG  1147 FLG
2047 FLG  0353 XMT  3750 XMT  0041 PRE
3047 FLG  1147 FLG  FF50 XMT  5347 JFG
4047 FLG  3940 JMP  3250 XMT  2E40 JMP
A340 JMP  6141 PRE  3250 XMT  7F41 PRE

5047 FLG  9140 JMP  3250 XMT  1247 JFG
2441 PRE  025- XMT  0047 FLG  1047 FLG
0147 FLG  0058 BCC  0247 JFG  2041 PRE
8940 JMP  2750 XMT  0049 -RM  3347 JFG
0298 nop  F150 XMT  1283 DLY  1241 PRE
6050 XMT  F550 XMT  0187 CTR  5247 JFG
6050 XMT  1D50 XMT  3084 INT  4247 JFG
1840 JMP  E850 XMT  0C97 INT  3F40 JMP

1082 DLY  1150 XMT  8071 232  0038 BCC
2B41 PRE  D550 XMT  6094 AUX  0214 REC
8940 JMP  5050 XMT  3217 TRP  5194 AUX
1050 XMT  0164 MSG  0287 CTR  EE41 PRE
7C50 XMT  1D50 XMT  0897 INT  7D44 JEC
A340 JMP  6050 XMT  BB41 PRE  C540 JMP
3041 PRE  3C50 XMT  014e RTJ  41.7 FLG
8940 JMP  5D50 XMT  E841 PRE  C540 JMP

0250 XMT  F450 XMT  0246 RTJ  0000 HLT
3B41 PRE  4B50 XMT  D441 PRE  0020 TRP
6347 JFG  4050 XMT  1046 RTJ  0020 TRP
6147 FLG  C550 XMT  2E41 PRE  0000 HLT
1058 BCC  D550 XMT  3D4e RTJ  0000 HLT
0166 MSG  C450 XMT  B841 PRE  0000 HLT
0167 MSG  4050 XMT  3746 RTJ  0000 HLT
0163 MSG  D650 XMT  7F40 JMP  0000 HLT

0350 XMT  Ce50 XMT  1241 PRE  0000 HLT
0059 BCC  4050 XMT  2247 JFG  0000 HLT
A340 JMP  E350 XMT  0940 JMP  0000 HLT
6047 FLG  C550 XMT  0038 BCC  0000 HLT
5147 FLG  E250 XMT  7F41 PRE  0000 HLT
0058 BCC  E350 XMT  eC45 JNC  FF40 JMP
3540 JMP  3840 JMP  5194 AUX  0940 JMP
1147 FLG  8241 PRE  C441 PRE  0897 INT
SK
```

Figure 2-14. Inter-KEY Program Listing.

f. Data and Functions are printed in the same order as on the Program Sheet, permitting easy transfers from Printout to Program Sheets or vice versa.

g. All characters are printable, even control characters; therefore, the program can be listed on any Printer and may even be sent over a TWX network.

h. The character after the last s is a BCC check and may not print.

5.0 MESSAGE TEXT

Figure 2-15 shows the text of the message form (Figure 1-2) transmitted by the DTM to the 3270. Both the ASCII and EBCDIC hexadecimal equivalents of each character are shown, and the control characters are defined.

The user should consult the reference documents listed in Part I, Section 7 for specific definitions. A brief description of the control character sequences used follows:

- ERASE/WRITE = "ESC 5". The 3270 terminal will reset the buffer address to home after erasing the display. Unless specified, the first character will be written at the home location.

- WRITE = "ESC 1". The 3270 will display the next received character where the cursor is manually positioned on the screen or at the next location from the last character written to the screen.

- SBA (Set Buffer Address) = "DC1 ROW COL". The two characters following DC1 define the row (1-24) and column (1-80) where the next character will be written.

- START FIELD = "GS Char". The (attribute) character following GS defines the characteristics of all characters written on the screen beginning at the next address and ending at the next GS. The attributes "wrap around" the display screen and can be used to generate various visual effects when writing on NON-BUFFERED terminals. The selections for attributes are: *Protected* (operator cannot change the character displayed), *Hidden* (the character is present but not displayed; e.g., private security information codes), *Blink* (character blinks), *Highlight* (character is brighter than normal, *Numeric* (character can only be digits, minus and period) and *Modified* (a modified character is available to be transmitted from the 3270 to the CPU . . . . generally all operator-entered fields are modified).

- RTA (Repeat to Address) = "DC4 ROW Col Char". This instruction causes the character to be repeated from the present buffer address to *one less than* the specified row and column. Printing dots through column 70 would place a dot at column 70 and the column specified would be column 71.

- WRITE CONTROL CHARACTER. The first character after ERASE/WRITE or WRITE identifies the characteristics applicable to the write operation. These characteristics start the printer, sound the terminal audible, place the terminal keyboard in local (if not in local, the keyboard is locked out and not available to the operator), and define the character fields entered by the operator (or prior CPU action) as available for transmission from the 3270 to the CPU.

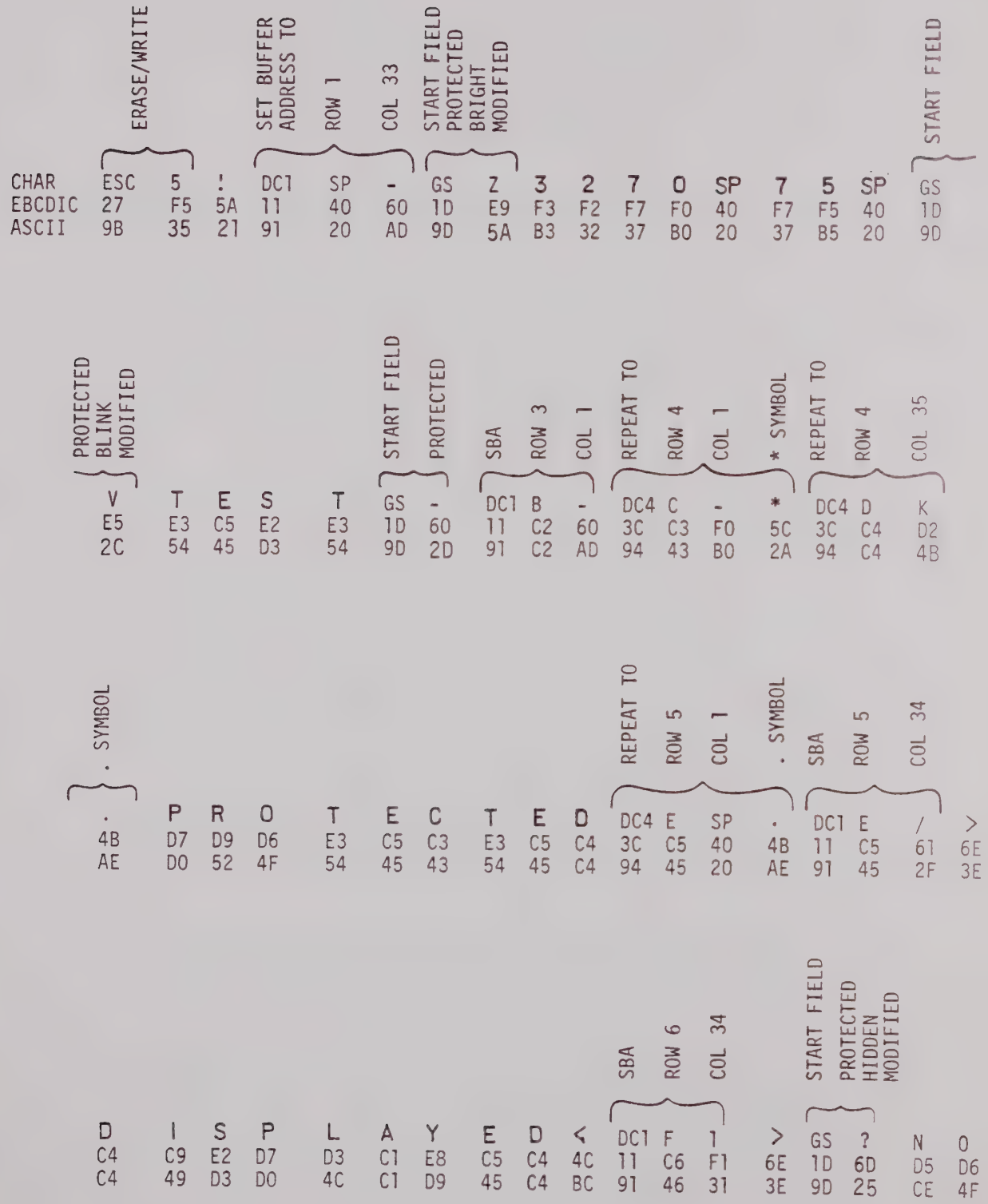


Figure 2-15. Message Form (PROMs 842G; see Table 2-2 and Figure 2-1 for message PROM contents).

N	-	D	I	S	GS	-	<	N	O	N	-	D	I	S	P	L	A	Y
					START FIELD	PROTECTED												
D5	60	C4	C9	E2	1D	60	4C	D5	D6	D5	60	C4	C9	E2	D7	D3	C1	E8
CE	AD	C4	49	D3	9D	AD	C4	CE	4F	CE	AD	C4	49	D3	D0	4C	C1	D9

E	D	DC1	H	0	GS	/	DC4	I	J	.	N	O	N	-	P	R	O
		SBA	ROW 8	COL 1	START FIELD	PROTECTED MODIFIED	RTA	ROW 8	COL 34	. SYMBOL							
C5	C4	11	C8	F0	1D	61	3C	C9	D1	4B	D5	D6	D5	60	D7	D9	D6
45	C4	91	C8	B0	9D	2F	94	49	4A	AE	CE	4F	CE	AD	D0	52	4F

T	E	C	T	E	D	DC4	¢	SP	.	DC1	¢	]	GS	/	>	GS	A
						RTA	ROW 9	COL 1	. SYMBOL	SBA	ROW 9	COL 32	START FIELD	PROTECTED MODIFIED		START FIELD	MODIFIED
E3	C5	C3	E3	C5	C4	3C	4A	40	4B	11	4A	5F	1D	61	6E	1D	C1
54	45	43	54	45	C4	94	5B	20	AE	91	5B	5E	9D	2F	3E	9D	C1

DC3	INSERT CURSOR																
	DC4	¢	%	.	GS	/	<	GS	-	A	L	P	H	A	DC1		
	RTA	ROW 9	COL 45	. SYMBOL	START FIELD	PROTECTED MODIFIED		START FIELD	PROTECTED						SBA		
13	3C	4A	6C	4B	1D	61	4C	1D	60	C1	D3	D7	C8	C1	11		
13	94	5B	25	AE	9D	2F	BC	9D	AD	C1	4C	D0	C8	C1	91		

Figure 2-15. (Continued).

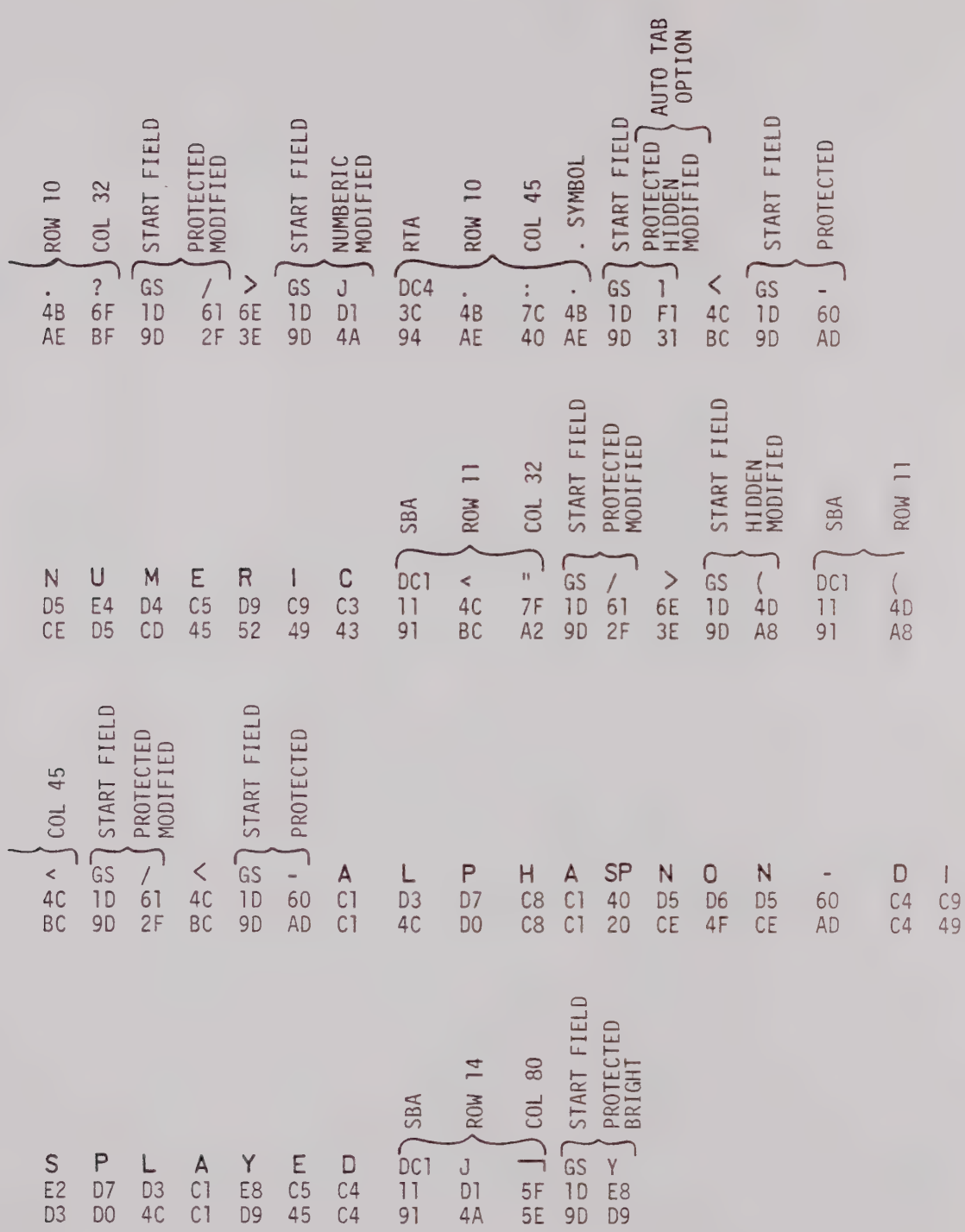


Figure 2-15. (Concluded).

6.0 FLAG ASSIGNMENTS

One characteristic of this program is its ability to know what happened last – in order to determine if an error was made – and to determine what happens next. As the program operates, it sets various one-bit memory latches called flags to either 1 or 0. There are 8 such flags available to the DTM user. Seven are used in this program. The DTM START procedure, depressing the MARK and then START button, correctly initializes the INTERSHAKE test system and sets all flags to 0.

FLAG 0 – The RETURN (R) flag is set to 0 to preset the subroutine exit point to generate only three syncs (or to 1 to include the reset sequence).

FLAG 1 – The ACK flag keeps track of whether the 3270 should reply with ACK 0 or ACK 1. This flag is tested to determine if an out of sequence ACK is received. The endurance test checks this flag to define an error.

FLAG 2 – The S&S flag is set to 1 for an S&S message received, e.g., on 3270 power-up, and causes the General Poll to continue until all device status is in or to start the Specific Poll after all device status is in.

FLAG 3 – The RQTST (Request Test) flag is set to a 1 for receipt of the RQTST message from the 3270. This flag causes the transmission of the message form to the 3270.

FLAG 4 – The ENTER flag is set to a 1 by receipt of the ENTER AID. The combination of ENTER and MSG and E tells the DTM that the operator has entered data into a good message and that ECHO ENTER is the next transmit module.

FLAG 5 – The MSG (Message) flag is set to 1 when the message form is sent to the 3270.

FLAG 6 – The E (Error) flag is set to 1 for a good BCC. This flag alternates beginning with a Bad BCC. The 3275 terminal requires the RQTST key request the form bad, then good, etc. . The 3270 RQTST will always call a Bad BCC first, then the NAK response will always automatically call the Good BCC.

FLAG 7 – Not used.

PART III

PROGRAMMING HINTS

1.0 SEQUENCE OF WRITING A PROGRAM

The following method is recommended to generate programs more quickly, to reduce errors and provide documentation for operation, debugging, and future changes.

The process is iterative; that is, certain aspects are repeated and updated as the program matures.

Each user will find individual preferences and techniques that are comfortable. This outline is provided as an aid especially to the beginner. Experienced programmers will have already developed their own "systems."

1. Write a sequence of operation as shown in Figure 1-1. There should be columns headed

   DTM – Operations of the DTM, e.g., Send Data

   Terminal – Operations of the Terminal/CPU, e.g., Send

   Terminal Operator – Operator tasks at the terminal

   DTM Operator – Operator tasks at the DTM, e.g., observe display, operate a key.

2. Consolidate the sequence of operations into a program module flow chart as shown in Figure 2-2. This requires some estimating of which important parameters belong in what module.

3. List all program modules by name on a form as shown in Table 2-3 (address, size, and other details will be added later).

4. Generate a flow chart for each module such as shown in Figures 2-5 through 2-11. Identify all flags used and define the sense 1 or 0 as to meaning, e.g., ERROR = 1. Add the flag information to Table 2-3.

   As the modules are developed, be sure every flag is set to 0 and 1 and tested. A common error is to forget to re-initialize the flag after it is used (see the ACK module ACK flag set).

   Make a list of module entry and exit names and add to Table 2-3.

5. Begin writing the module programs by writing only the function NAME on the program sheets, beginning each module at step 10. When learning to program, the writer usually omits some necessary startup step that can be added later as step 9, 8, 7, etc. Leave room at the start.

Each module should be written on a separate program sheet. Do not be concerned about the DATA. Only write the function numbers for the functions that are related to other steps or functions, e.g., Preset.

> Be sure to use *arrows* and *names* for all *jump destinations*. Circle the address for all points at which other program operations will *enter* each module. An example is step 2E in Appendix A: "MSG".

6. Transfer the number of steps to the Table 2-3 form and add them to determine whether a 128- or 256-step cell is required. The total number of steps should leave *at least 20%* margin for the cell size selected for the first pass.

7. List all of the DTM set-up criteria. Now review the original sequence of operation and compare it to all the exit and entry points of the modules.

8. This is the first time the program is to be written as a consecutive listing.

   a. Always start with a NO-OP for the first step of any program.

   b. Select the module(s) requiring operator editing near the front of the program, e.g., terminal address entry.

   c. On the first writing, leave several spare steps between each program module.

   d. First fill in all program steps only with the functional description.

   e. Next fill in all entry and exit (JUMP) destinations with the names given.

   f. Next connect all the Jumps together by *NAME*.

   g. Next add the address (HEX) starting location for all start locations or entry points to Table 2-3.

   h. Enter the Hex jump address to all Function 40, 41 steps. Check for completeness, e.g., that all Jumps go to the proper place, etc.

   i. Add all other function numbers.

   j. Add all other non-character data.

   k. Add all other character data (observing parity if required).

9. Display the program on the INTERVIEW as shown in Figures 2-12 and 2-13.

10. Operate the program.

11. Debugging the program is assisted by observing the INTERVIEW and using the REVERSE image at various program locations to show the progress. HALT and beeps can be also used quite effectively to check the progress of the program.

2.0 RECEIVE-SORT

A generally accepted good practice is to use a common receive program to "classify" each receive transmission for action by DTM. The REC, ACK, S&S, AID modules show in detail examples of this capability. See Figures 2-2 and 2-5.

3.0 TRANSMIT

Since every synchronous transmission requires several SYNC characters plus dynamic operation of the control leads, these repeated operations can be made into a subroutine common to all transmit sequences. Refer to the START TX subroutine (Figure 2-8), Section 11, and Figure 3-1.

4.0 EDIT

An effective technique to make it easy for the operator to find the step to be edited is to precede the step with a NO-OP. The operator can then scroll search to the NO-OP, and take one more step to the step to be edited. Refer to Part I, Section 5 and Table 1-1.

5.0 ALTERNATE BCC ERRORS

Forcing the BCC error is an important test of the error recovery routine of the device being tested. A flag can be used as a one-bit counter to divide by 2. This permits alternating between a Good and Bad BCC by testing the flag. The MSG module, Figure 2-10, depicts this technique. Two flags will divide by 4, and so on.

6.0 MESSAGE GENERATION

Functions 60 through 67 permit 8 messages to be canned in the DTM firmware. There are certain characteristics of special messages that should be considered:

- There are two classes of messages: those that must be the first part of the transmit text, and those that can be used anywhere in the text.
- No message should include STX or SOH, as this would permit generation of BCC by the DTM.
- No message should include ETX as this would permit another message to be added onto the end to make a longer message.
- When two or more messages are to be used as a sequence, one always follows the other. *NO* multiple character control function such as Set Buffer Address should bridge across from one message into the next. All control sequences must complete within a message to allow intermixing of messages.
- Messages should contain as many exercises of the terminal attributes as possible. The displayed format should be symmetrical and readable (in clear sentence structure if possible).
- All messages should include both upper and lower case in sufficient quantity to permit the features of the terminal or device under test to be fully tested.

7.0 TRANSMIT TIMING

The DTM permits precise determination of transmit timing. The time relationship between the last transmit character and turning off RTS may be critical to some systems. This delay can be accurately defined in 1-msec increments or in terms of bits (which of course remain constant as the bit rate changes). Section 5.7 of Part I describes the transmit timing criteria used here.

8.0 SAVING PROGRAM STEPS

As with any programmable test system, conservation of program memory permits more comprehensive programs to be used for a given program memory cell size. Economy can be achieved with these techniques:

- Use of Subroutines.
- Combining program modules that have features in common so that the shared steps only have to be enetered once. Refer to Figures 2-7, 2-9, and 2-10 for examples.

9.0 CLEAR RESULTS MEMORY

Whenever the results memory is to be used to record in a test, it is good practice to clear it at the start of each program execution. A three-step sequence performs this in about 9 msec. This sequence is contained in Steps 06, 07 and 08 of the program. Basically, Function 07 writes 00 into the RM and then the RM is tested to jump, when RM is *NOT* full, back to write 00 again. This process repeats until the RM is full and the program does not jump but falls through to the next program step.

10.0 PROGRAM PATCH

At some time or other every program will probably be used in a special case requiring a change in the middle of a program module.

A patch is obtained by placing in the step *after* the last valid instruction a JUMP to a vacant area of the program memory. The added program is written here and JUMPS back to the next valid instruction in the original program. This process costs two extra program steps (for the JUMPS) over the perfect program.

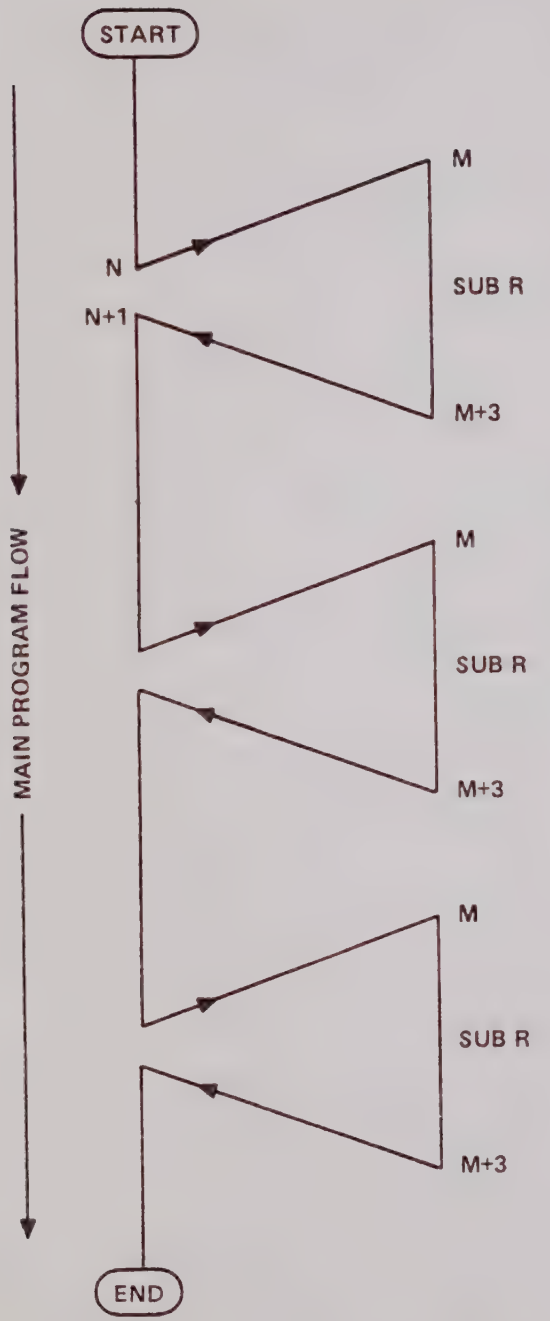
11.0 SUBROUTINES

A subroutine is short program module that is reused several times in a program. Instead of writing the same sequence of steps over again several times, it is only written once.

Since three steps are required to use a subroutine, the subroutine is only of value for more than three steps. However, a subroutine may also be used to permit the operator to enter a value or delay only once instead of several times in the program.

Each using program module uses a conventional JUMP (Function 40) to get to the subroutine. Therefore, any program module can get to the subroutine.

To return from the subroutine requires a conditional jump as the last step of the subroutine. The program should jump from the last step of the subroutine back into the program sequence from which it started.



Using FUN 40, 41, 47

STEP	DATA	FUN	
N-1	N+1	41	Preset Return
N	M	40	Go to S.R.
N+1	–	–	Next program step
	(Subroutine)		
M	–	–	Subroutine program may
M+1	–	–	NOT use FUN 41
M+2	–	–	
M+3	02	47	JUMP FLAG 0 = 0

For Serial No. F Series and After

Using FUN 40, 27, 28

STEP	DATA	FUN	
N-1	N+1	27	Preset
N	M	40	Go to S.R.
N+1	–	–	Next program step
	(Subroutine)		
M	–	–	Subroutine program may
M+1	–	–	contain FUN 41
M+2	–	–	
M+3	–	28	Return

Figure 3-1. Subroutine.

DTM conditional jumps go to the address previously PRESET (Function 41). The Format for subroutines is as follows:

a. Step N contains the JUMP (Function 40) to the subroutine address.

b. Step N-1 contains the PRESET to the address to which the subroutine will jump when complete. Function 41 usually addresses step N + 1. In many cases the subroutine can be directed to return anywhere in the program, thus saving instructions.

c. The last step of the subroutine contains a known conditional JUMP. For example, START sets all flags to 0, so JUMP FLAG 0 = 0 will always jump to the most recent preset Function 41.

d. Using this technique, a PRESET (Function 41) may NOT be used within the subroutine itself.

NOTE

DTM models of Series F or higher contain dedicated additional subroutine functions. This permits jumps in the subroutine — or nesting (e.g., one subroutine calling another subroutine).

Function 27	Preset return address
Function 28	Return

Figure 3-1 shows the use of a subroutine in a program graphically.

APPENDIX A

FILE D01B:

EBCDIC 3270 FIRMWARE STORED TEST

INTERSHAKE II PROGRAM

TITLE: 3270-3275 DIAGNOSTIC TEST (EBCDIC)

FILE NO. D01B
SHEET 1 OF 4

DESCRIPTION:
- EMULATES CPU/FEP TO TEST 3270 OR 3275 TERMINAL.
- OPERATES REMOTE THRU MODEMS.*
- SEVERAL EDIT FEATURES BUILT IN.

*EDIT FOR TEST LOCAL TERMINAL

OBJECTIVE:
1) AUTO MODE PERMITS TERM OPERATOR VERIFICATION OF "OK" TERM.
2) INTERACTIVE MODE PERMITS DTM OPERATOR DIAGNOSTICS FOR TROUBLES.

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ←	JUMP →
C 8 4 (0)	0	0	(50)	(47)	Set MSG FLAG = 0	START	
	1	1	2D	19	INT CHAR=ENQ		
	2	2	03	97			
	3	3	FF	57	TX Fill Character		
	4	4	32	90	RX Sync Character		
	5	5	10	95	Auto Sync Mode		
(0)	6	6	00	07	Write 00 — CLEARS		
0	7	7	06	41	PRE — RM		
	8	8	82	47	Jump Til MEMOVFL		
(0)	9	9	0C	41	Preset Return	GEN POLL	
	A	10	01	47	SF0=1		
	B	11	89	40	Go To		Start TX
(0)	C	12	02	98	No-Op (Enter SPA)		
	D	13	40	50	SPA		
	E	14	40	50	SPA		
	F	15	7F	50	"		
D 9 5 (1)	0	16	7F	50	"		
	1	17	1A	40	Jump		
(1)	2	18	15	41	Preset Return	SPECIFIC POLL	
	3	19	01	47	Set F0=1		
	4	20	89	40	Go To		Start TX
(1)	5	21	02	98	No-Op (Enter SPA & DA)		
	6	22	40	50	SPA		
1	7	23	40	50	SPA		
	8	24	40	50	DA	DA	
	9	25	40	50	DA		
(1)	A	26	2D	50	ENQ		
	B	27	10	47	Set ACK F = 0		
	C	28	20	47	Set S&S F = 0		
	D	29	30	47	Set RQTST F = 0		
	E	30	40	47	Set ENTER F = 0		
	F	31	A2	40	Jump		REC

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

- CODE: EBCDIC
- SPEED: ANY
- ASYNC (SYNC)
- SYN CHARACTER: 32
- STOP BIT: 1.0 1.5 2.0
- BITS: 5 6 7 (8)
- PARITY: (NONE) ODD EVEN
- CONTROL EIA (OFF)
- ON-LINE: TD/RD, TD, RD
- OFF-LINE: TERM / MODEM
- MON SIGS (NORMAL)
- PATCH CORDS
- CONTROL EIA (V.24): T.T. DSR ON RLSD OFF, CTS ON TM DTR ON RTS OFF
- COUNTER ZONE: DURATION XXX MS
- INTERRUPTS: TIMER CHARACTER
- FLAGS: 0 THRU 6
- LATCH: CRT CONTROLS

CONTINUE ON OTHER SIDE

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ALEXANDRIA, VA. 22314 (703) 354-3400

CONTINUE ON OTHER SIDE

ADDRESS (PAGE (CIRCLE ONE) 3 2 1 0)		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ←	JUMP →	ADDITIONAL INFORMATION (WRITE IN)
E A 6 2	0	32	50	47	Set MSG F = 0	(SELECT)		3270/75 D01B
	1	33	24	41	Preset Return			
	2	34	01	47	Set F0 = 1			
	3	35	89	40	Go To		Start TX	
2	4	36	02	98	No-Op (Enter SSA)			
	5	37	60	50	SSA			
	6	38	60	50	SSA			
2	7	39	18	40	Jump		DA	
2	8	40	10	82	1 Sec Delay 3275 STATUS LITE ON FOR BCC ERROR	(RVI)		
	9	41	2B	41	Preset Return			
	A	42	89	40	Go To		Start TX	
2	B	43	10	50	DLE			
	C	44	7C	50	@			
	D	45	A2	40	Jump		REC	
2	E	46	30	41	Preset Return	(MSG)		
	F	47	89	40	Go To		Start TX	
F B 7 3	0	48	02	50	STX			
	1	49	35	41	PRE			
	2	50	55	47	J E Flag = 1			
	3	51	31	47	S E Flag = 1			
	4	52	10	58	Start Bad BCC			
3	5	53	01	66	MSG 1			
	6	54	01	67	MSG 2			
3	7	55	01	63	MSG 3			
	8	56	03	50	ETX		MSG ETX	
	9	57	00	59	Send BCC		MSG BCC	
	A	58	A2	40	Jump		REC	
3	B	59	60	47	Set E Flag = 0			
	C	60	51	47	S MSG Flag = 1			
	D	61	00	58	Start BCC OK			
	E	62	55	40	Jump			
3	F	63	11	47	Set ACK F = 1	(ACK ESC)		

ADDITIONAL REMARKS

1 - REFER TO TEXT FOR OPERATIONAL INSTRUCTIONS.
2 - SPECIAL MESSAGE PROM 842G MUST BE USED.
3 - EDIT PARAMETERS-DATA-FUNCTION ARE IN (XX).

PROGRAM LOCATION
DTM S/N
CELL G, H
RAM
PROM

PROGRAM WRITTEN BY: J.L. WALLACE
DATE 3-9-77
COMPANY NAME: ATLANTIC RESEARCH CORPORATION
TEL. NO
ADDRESS:

FORM NO. TP-139-3-77

INTERSHAKE II PROGRAM

TITLE: 3270-3275 | FILE NO D01B | SHEET 2 OF 4

DESCRIPTION

OBJECTIVE:

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C 8 4 0	0	0	42	41	Preset Return	
	1	1	89	40	Go To Start TX	→
4 2	2	2	02	50	STX	←
	3	3	00	58	Start BCC	
	4	4	27	50	ESC "WRITE"	
	5	5	F1	50	1	
4	6	6	F2	50	2 KBD LOCAL	
	7	7	1D	50	GS	
	8	8	61	50	/ (Prot, Modified)	
	9	9	40	50	SP	
	A	10	C1	50	A	
	B	11	C9	50	I	
	C	12	C4	50	D	
	D	13	1D	50	GS	
	E	14	E9	50	Z (Prot, Highlight, MOD)	
	F	15	00	50	Send RM	
D 9 5 1	0	16	40	50	SP	
	1	17	13	50	Insert Cursor	
	2	18	1D	50	GS	
	3	19	C1	50	/ (MOD)	
	4	20	38	40	Jump MSG ETX	→
5 5	5	21	57	41	Preset Return ECHO ENTER	←
	6	22	89	40	Go To Start TX	→
5 7	7	23	02	50	STX	←
	8	24	00	58	Start BCC	
	9	25	27	50	ESC "ERASE/WRITE"	
	A	26	F5	50	5	
	B	27	F1	50	1 KYBD Locked Out	
	C	28	03	53	Send RM Until Trap Character = ETX	
	D	29	11	47	SET ACK FLAG = 1	
	E	30	39	40	Jump BCC MSG	
5 F		31	61	41	Preset Return END OF TEST	←

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

- CODE
- SPEED
- ASYNC / SYNC
- SYN CHARACTER
- STOP BIT 1.0 , 1.5 , 2.0
- INFO BITS 5 , 6 , 7 , 8
- PARITY NONE , ODD , EVEN
- CONTROL EIA / OFF
- ON-LINE TD/RD , TD , RD
- OFF-LINE TERM / MODEM
- MON SIGS / NORMAL
- PATCH CORDS
- CONTROL EIA (V. 24)
- COUNTER ZONE
- INTERRUPTS
- FLAGS
- LATCH

CONTINUE ON OTHER SIDE

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CONTINUE ON OTHER SIDE

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →	ADDITIONAL INFORMATION (WRITE IN)
E A 6 2	0	32	90	40	Go To Start TX	→	3270/75 D01B
6	1	33	02	50	STX ←		
	2	34	00	58	Start BCC		
	3	35	27	50	ESC "WRITE"		
	4	36	F1	50	1		
	5	37	7D	50	' KBD Locked Out, Start Printer, Bell		
	6	38	1D	50	GS		
6	7	39	E8	50	Y (Prot, Hi, UNMOD)		
	8	40	11	50	DC1 SET BUFFER ADRS		
	9	41	D5	50	Row 18		
	A	42	50	50	Col 0		
	B	43	01	64	127 CHAR MSG		
	C	44	1D	50	GS		
	D	45	60	50	— (Prot, UNMOD)		
	E	46	3C	50	DC4 "REPEAT TO ADRS"		
	F	47	5D	50	Row 24		
F B 7 3	0	48	F4	50	Col 39		
	1	49	4B	50	Character Dot		
	2	50	40	50	SP		
	3	51	C5	50	E		
	4	52	D5	50	N		
	5	53	C4	50	D		
	6	54	40	50	SP		
7	7	55	D6	50	O		
	8	56	C6	50	F		
	9	57	40	50	SP		
	A	58	E3	50	T		
	B	59	C5	50	E		
	C	60	E2	50	S		
	D	61	E3	50	T		
	E	62	38	40	Jump MSG ETX	→	
7	F	63	82	41	Preset ESD		

ADDITIONAL REMARKS

PROGRAM LOCATION
DTM S N
CELL
RAM
PROM

PROGRAM WRITTEN BY: J.L.W. DATE

COMPANY NAME: ATLANTIC RESEARCH CORPORATION TEL. NO

ADDRESS:

FORM NO. TP-139-3-77

INTERSHAKE II PROGRAM

TITLE: 3270-3275

FILE NO. D01B
SHEET 3 OF 4

DESCRIPTION

OBJECTIVE

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →	APPLICABLE INFORMATION (WRITE IN OR CIRCLE)
C 8 4 0	0	0	FF	46	RT&J = FF		CODE
	1	1	7F	40	Jump END	→	SPEED
8	2	2	84	41	Preset Return		
	3	3	8F	40	Go To	*	ASYNC / SYNC
8	4	4	37	50	EOT		SYN CHARACTER
	5	5	01	70	Alarm ON		STOP BIT 1.0 , 1.5 , 2.0
	6	6	40	81	Delay		INFO BIT 5 , 6 , 7 , 8
8	7	7	01	71	Alarm OFF		PARITY NONE , ODD , EVEN
	8	8	00	99	STOP / Jump To GEN POLL		
8	9	9	02	94	Disable Char. Interrupt START TX	← *	CONTROL EIA / OFF
	A	10	10	95	Auto-Sync (Force out of Sync)	*	ON-LINE TD/RD , TD , RD
	B	11	(15)	(80)	Delay	*	OFF-LINE TERM / MODEM
	C	12	01	71	Beep OFF	*	
	D	13	(02)	(82)	AUTO MODE = 200ms Poll Rate	*	MON SIGS / NORMAL
8	E	14	(02)	(98)	No-Op	*	PATCH CORDS
	F	15	00	94	Clear OFF		
D 9 5 1	0	16	(10)	(73)	DET RLSD OFF		CONTROL EIA (V. 24)
	1	17	(80)	(70)	Raise RTS		
	2	18	(02)	(98)	Start Timer		
	3	19	(40)	(72)	Det CTS ON		COUNTER ZONE
	4	20	02	87	Stop Timer		
	5	21	00	49	Set RM Page 0		
	6	22	61	94	CRT Low ON		INTERRUPTS
9	7	23	32	50	SY		
	8	24	32	50	SY		
	9	25	32	50	SY		FLAGS
	A	26	02	47	Jump FO = 0		
	B	27	37	50	EOT		
	C	28	FF	50	FF		LATCH
	D	29	32	50	SY		
	E	30	32	50	SY		
	F	31	32	50	SY		

CONTINUE ON OTHER SIDE

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CONTINUE ON OTHER SIDE

*Starred entries are those that have been changed in this firmware revision.

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS		JUMP ← →	ADDITIONAL INFORMATION (WRITE IN)
E A 6 2	0	32	00	47	Set FO = 0			3270/75
	1	33	02	47	J FO = 0	RETURN	→	0018
A	2	34	00	49	Set RM Page = 0	(REC)	←	
	3	35	(12)	(83)	Wait N Bits			
	4	36	(01)	(87)	Start Timer			
	5	37	(30)	(84)	Set 3 Sec For INT Timer	MEASURE TERMINAL		
	6	38	(0C)	97	Enable INT Timer	RESPONSE TIME		
A	7	39	(80)	(71)	Drop RTS			
	8	40	60	94	CRT Low OFF			
	9	41	32	17	Wait ≠ SYNC			
	A	42	02	87	Stop Timer			
	B	43	(08)	(97)	Int Disable			
	C	44	BA	41	Preset			
	D	45	01	46	RT&J = SOH	S&S	→	
	E	46	E7	41	Preset			
	F	47	02	46	RT&J = STX	AID	→	
F B 7 3	0	48	D3	41	PRE			
	1	49	10	46	RT&J = DLE	ACK	→	
	2	50	2E	41	PRE			
	3	51	3D	46	RT&J = NAK	MSG	→	
	4	52	B7	41	PRE			
	5	53	37	46	RT&J = EOT			
	6	54	7F	40	Jump	END	→	
B	7	55	12	41	PRE			
B	8	56	22	47	J S&S F = 0	SPEC POLL	→	
	9	57	09	40	Jump	GEN POLL	→	
B	A	58	00	38	Start BCC	(S&S)	←	
	B	59	7F	41	PRE			
	C	60	6C	45	J ≠ %	END	→	
	D	61	51	94	CRT Rev ON			
	E	62	C3	41	PRE			
	F	63	61	44	J = (R'TST)	SET TST	→	

ADDITIONAL REMARKS

PROGRAM LOCATION
DTMSN
CELL
RAM
PROM

PROGRAM WRITTEN BY: J. L. W. DATE

COMPANY NAME: ATLANTIC RESEARCH CORPORATION TEL. NO

ADDRESS

FORM NO. TP-139-3-77

INTERSHAKE II PROGRAM

TITLE: 3270-3275

FILE NO. D01B
SHEET 4 OF 4

DESCRIPTION:

OBJECTIVE:

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
(C) 8 4 0	0	0	CC	41	PRE	
	1	1	D9	46	RT&J = R	
	2	2	7F	40	Jump	END →
(C)	3	3	31	47	Set RQTST F = 1	SET TST ←
(C)	4	4	00	36	Record Current Character	X S&S ←
	5	5	50	94	CRT REV OFF	
	6	6	03	25	Record Until ETX	
	7	7	7F	41	PRE	
C	8	8	00	39	J = BCCL	END →
	9	9	28	41	PRE	
	A	10	23	47	J S&S F = 1	RVI →
	B	11	CF	40	Jump	
(C)	C	12	21	47	Set S&S F = 1	
	D	13	05	14	Wait 5 Characters	
	E	14	C4	40	Jump	
(C)	F	15	3F	41	PRE	
D 9 5 1	0	16	42	47	J Enter = 0	AID ECHO →
	1	17	52	47	J MSG = 0	AID ECHO →
	2	18	55	40	Jump	ECHO ENTER →
(D)	3	19	D8	41	PRE	(ACK) ←
	4	20	70	44	J = 70 ACK 0	
	5	21	DE	41	PRE	
	6	22	61	46	RT&J = 61 ACK 1	
D	7	23	7F	40	Jump	END →
(D)	8	24	7F	41	PRE	
	9	25	13	47	J ACK F = 1	END →
	A	26	11	47	S ACK F = 1	
	B	27	(00)	41	PRE	
	C	28	53	47	J MSG F = 1	START →
	D	29	2E	40	Jump	MSG →
(D)	E	30	7F	41	PRE	
	F	31	12	47	J ACK F = 0	END →

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

- CODE
- SPEED
- ASYNC / SYNC
- SYN CHARACTER
- STOP BIT 1.0 , 1.5 , 2.0
- CHAR BIT 5 , 6 , 7 , 8
- PARITY NONE , ODD , EVEN
- CONTROL EIA / OFF
- ON-LINE TD/RD , TD , RD
- OFF-LINE TERM / MODEM
- MON SIGS / NORMAL
- PATCH CORDS
- CONTROL EIA (V. 24)
- COUNTER ZONE
- INTERRUPTS
- FLAGS
- LATCH

CONTINUE ON OTHER SIDE

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CONTINUE ON OTHER SIDE

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
L A 6 2	0	32	10	47	S ACK F = 0	
	1	33	20	41	PRE	
	2	34	33	47	J RQTST F = 1 SELECT	→
	3	35	12	41	PRE	
	4	36	52	47	J MSG = 0 SPEC POLL	→
	5	37	42	47	J Enter = 0 SPEC POLL	→
	6	38	5F	40	JUMP END OF TEST	→
E	7	39	00	38	Start BCC (AID)	←
	8	40	02	14	Wait 2 Characters	
	9	41	51	94	Rev ON CRT	
	A	42	ED	41	PRE	
	B	43	7D	44	J = Enter	
	C	44	C4	40	Jump X S&S	→
	D	45	41	47	Set Enter F = 1	
	E	46	C4	40	Jump X S&S	→
	F	47				
F B 7 3	0	48				
	1	49				
	2	50				
	3	51				
	4	52				
	5	53				
	6	54				
	7	55				
	8	56				
	9	57				
	A	58				
	B	59				
	C	60				
	D	61	FF	40	Time OUT INT (3 Sec)	
	E	62	09	40	Character INT (ENQ) GEN POLL	→
	F	63	08	97	Disable INT Timer START/GEN POLL	→

ADDITIONAL INFORMATION (WRITE IN)

3270/75
D01B

ADDITIONAL REMARKS

PROGRAM LOCATION
DTMSN
CELL
RAM
PROM

PROGRAM WRITTEN BY: J.L.W. DATE

COMPANY NAME: ATLANTIC RESEARCH CORPORATION TEL. NO.

ADDRESS:

FORM NO. TP-139-3-77

Inter-KEY Program Listing

(For an explanation of this listing format, see Part II, Section 4.3.)

```
Go
5047 FLG  4241 PRE  FF46 RTJ  CC41 PRE
2D19 INT  8940 JMP  7F40 JMP  D946 RTJ
0397 INT  0250 XMT  8441 PRE  7F40 JMP
FF57 xmt  0058 BCC  8F40 JMP  3147 FLG
3290 SYN  2750 XMT  3750 XMT  0036 REC
1095 SYN  F150 XMT  0170 232  5094 AUX
0007 BSW  F250 XMT  4081 DLY  0325 REC
0641 PRE  1D50 XMT  0171 232  7F41 PRE

8247 JFG  6150 XMT  0099 END  0039 JBE
0C41 PRE  4050 XMT  0297 INT  2841 PRE
0147 FLG  C150 XMT  1095 SYN  2347 JFG
8940 JMP  C950 XMT  1580 DLY  CF40 JMP
0298 nop  C450 XMT  0171 232  2147 FLG
4050 XMT  1D50 XMT  0282 DLY  0514 REC
4050 XMT  E950 XMT  0298 nop  C440 JMP
7F50 XMT  0052 XMT  0094 AUX  3F41 PRE

7F50 XMT  4050 XMT  1073 232  4247 JFG
1440 JMP  1350 XMT  8070 232  5247 JFG
1541 PRE  1D50 XMT  0298 nop  5540 JMP
0147 FLG  C150 XMT  4072 232  D841 PRE
8940 JMP  3840 JMP  0287 CTR  7044 JEC
0298 nop  5741 PRE  0049 -RM  DE41 PRE
4050 XMT  8940 JMP  6194 AUX  6146 RTJ
4050 XMT  0250 XMT  3250 XMT  7F40 JMP

4050 XMT  0058 BCC  3250 XMT  7F41 PRE
4050 XMT  2750 XMT  3250 XMT  1347 JFG
2D50 XMT  F550 XMT  0247 JFG  1147 FLG
1047 FLG  F150 XMT  3750 XMT  0041 PRE
2047 FLG  0353 XMT  FF50 XMT  5347 JFG
3047 FLG  1147 FLG  3250 XMT  2E40 JMP
4047 FLG  3940 JMP  3250 XMT  7F41 PRE
A240 JMP  6141 PRE  3250 XMT  1247 JFG

5047 FLG  9040 JMP  0047 FLG  1047 FLG
2441 PRE  0250 XMT  0247 JFG  2041 PRE
0147 FLG  0058 BCC  0049 -RM  3347 JFG
8940 JMP  2750 XMT  1283 DLY  1241 PRE
0298 nop  F150 XMT  0187 CTR  5247 JFG
6050 XMT  7D50 XMT  3084 INT  4247 JFG
6050 XMT  1D50 XMT  0C97 INT  5F40 JMP
1840 JMP  E850 XMT  8071 232  0038 BCC

1082 DLY  1150 XMT  6094 AUX  0214 REC
2841 PRE  D550 XMT  3217 TRP  5194 AUX
8940 JMP  5050 XMT  0287 CTR  ED41 PRE
1050 XMT  0164 MSG  0897 INT  7D44 JEC
7C50 XMT  1D50 XMT  BA41 PRE  C440 JMP
A240 JMP  6050 XMT  0146 RTJ  4147 FLG
3041 PRE  3C50 XMT  E741 PRE  C440 JMP
8940 JMP  5D50 XMT  0246 RTJ  0000 HLT

0250 XMT  F450 XMT  D341 PRE  0000 HLT
3841 PRE  4B50 XMT  1046 RTJ  0000 HLT
6347 JFG  4050 XMT  2E41 PRE  0000 HLT
6147 FLG  C550 XMT  3D46 RTJ  0000 HLT
1058 BCC  D550 XMT  B741 PRE  0000 HLT
0166 MSG  C450 XMT  3746 RTJ  0000 HLT
0167 MSG  4050 XMT  7F40 JMP  0000 HLT
0163 MSG  D650 XMT  1241 PRE  0000 HLT

0350 XMT  C650 XMT  2247 JFG  0000 HLT
0059 BCC  4050 XMT  0940 JMP  0000 HLT
A240 JMP  E350 XMT  0038 BCC  0000 HLT
6047 FLG  C550 XMT  7F41 PRE  0000 HLT
5147 FLG  E250 XMT  6C45 JNC  0000 HLT
0058 BCC  E350 XMT  5194 AUX  FF40 JMP
3540 JMP  3840 JMP  C341 PRE  0940 JMP
1147 FLG  8241 PRE  6144 JEC  0897 INT
$)
```

APPENDIX B

FILE D02A:

ASCII 3270 FIRMWARE STORED TEST

INTERSHAKE II PROGRAM

TITLE: 3270-3275 DIAGNOSTIC TEST (ASCII)

FILE NO D02A
SHEET 1 OF 4

DESCRIPTION

- EMULATES CPU/FEP TO TEST 3270 OR 3275 TERMINAL.
- OPERATES LOCAL AT TERMINAL OR REMOTE THRU MODEMS.
- SEVERAL EDIT FEATURES BUILT IN.

OBJECTIVE

1) AUTO MODE PERMITS TERM OPERATOR VERIFICATION OF "OK" TERM.
2) INTERACTIVE MODE PERMITS DTM OPERATOR DIAGNOSTICS FOR TROUBLES.

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ←	JUMP →
C 8 4 (0)	0	0	50	47	Clear Flag 5		
	1	1	85	19	INT CHAR=ENQ		
	2	2	03	97			
	3	3	02	98	No-Op		
	4	4	16	90	RX Sync Character		
	5	5	10	95	Auto Sync Mode		
	(0) 6	6	00	07	Write 00 ← CLEARS		
0	7	7	06	41	PRE ← RM		
	8	8	82	47	Jump Til MEMOVFL		
	(0) 9	9	0C	41	Preset Return ← GEN POLL	←	
	A	10	01	47	SF0=1		
	B	11	89	40	Go To Start TX		→
	(0) C	12	02	98	No-Op (Enter SPA) ←		
	D	13	20	50	SPA ←		
	E	14	20	50	SPA ←		
	F	15	A2	50	"		
D 9 5 (1)	0	16	A2	50	"		
	1	17	1A	40	Jump		
	(1) 2	18	15	41	Preset Return ← SPECIFIC POLL	←	
	3	19	01	47	Set F0=1		
	4	20	89	40	Go To Start TX		→
	(1) 5	21	02	98	No-Op (Enter SPA & DA) ←		
	6	22	20	50	SPA ←		
1	7	23	20	50	SPA ←		
	8	24	20	50	DA ← DA	←	
	9	25	20	50	DA ←		
	(1) A	26	85	50	ENQ ←	←	
	B	27	10	47	Set ACK F = 0		
	C	28	20	47	Set S&S F = 0		
	D	29	30	47	Set RQTST F = 0		
	E	30	40	47	Set ENTER F = 0		
	F	31	A2	40	Jump REC		→

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

- CODE: ASCII
- SPEED: ANY
- ASYNC / (SYNC)
- SYN CHARACTER: 16
- STOP BIT: 1.0 / 1.5 / 2.0
- BITS/CHAR: 5 / 6 / (7) / 8
- PARITY: NONE / (ODD) / EVEN
- CONTROL EIA (OFF)
- ON-LINE: TD/RD, TD, RD
- OFF-LINE: TERM / MODEM
- MON SIGS / (NORMAL)
- PATCH CORDS: T.T. = CTS TO +12V
- CONTROL EIA (V.24): T.T. DSR ON, RLSD OFF; TM DTR ON RTS OFF
- COUNTER ZONE: DURATION XXX MS
- INTERRUPTS: TIMER CHARACTER
- FLAGS: 0 THRU 6
- LATCH: CRT CONTROLS

CONTINUE ON OTHER SIDE

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CONTINUE ON OTHER SIDE

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP
E A 6 2	0	32	50	47	Set MSG F = 0	(SELECT) ←
	1	33	24	41	Preset Return	
	2	34	01	47	Set F0 = 1	
	3	35	89	40	Go To	Start TX →
	(2) 4	36	02	98	No-Op (Enter SSA)	
	5	37	2D	50	SSA	
	6	38	2D	50	SSA	
2	7	39	18	40	Jump	DA →
	2 8	40	10	82	1 Sec Delay 3275 STATUS LITE ON FOR BCC ERROR	(RVI) ←
	9	41	2B	41	Preset Return	
	A	42	89	40	Go To	Start Tx
	(2) B	43	10	50	DLE	
	C	44	BC	50	@	
	D	45	A2	40	Jump	REC →
	(2) E	46	30	41	Preset Return	(MSG) ←
	F	47	89	40	Go To	Start TX →
F B 7 3	0	48	02	50	STX	
	1	49	3B	41	PRE	
	2	50	63	47	J E Flag = 1	
	3	51	61	47	S E Flag = 1	
	4	52	18	58	Start Bad BCC	
	(3) 5	53	01	66	MSG 1	
	6	54	01	67	MSG 2	
3	7	55	01	61	MSG 3	
	8	56	83	50	ETX	MSG ETX ←
	9	57	00	59	Send BCC	MSG BCC ←
	A	58	A2	40	Jump	REC →
	(3) B	59	60	47	Set E Flag = 0	
	C	60	51	47	S MSG Flag = 1	
	D	61	08	58	Start BCC OK	
	E	62	35	40	Jump	
	(3) F	63	11	47	Set ACK F = 1	(AID ECHO) ←

ADDITIONAL INFORMATION (WRITE IN)

3270/75
D02A

ADDITIONAL REMARKS

1 - REFER TO TEXT FOR OPERATIONAL INSTRUCTIONS.
2 - SPECIAL MESSAGE PROM 842G MUST BE USED.

PROGRAM LOCATION
DTM S/N
CELL G, H
RAM
PROM D02A

PROGRAM WRITTEN BY: J. L. WALLACE DATE 3-9-77
COMPANY NAME: ATLANTIC RESEARCH CORPORATION TEL NO
ADDRESS:

FORM NO. TP-139-3-77

INTERSHAKE II PROGRAM

TITLE: 3270-3275 | FILE NO 002A | SHEET 2 OF 4

DESCRIPTION

OBJECTIVE

ADDRESS PAGE (CIRCLE ONE) 3 2 (1) 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C 8 (4) 0	0	0	42	41	Preset Return	
	1	1	89	40	Go To — Start TX	→
(4) (2)	2	2	02	50	STX	←
	3	3	08	58	Start BCC	
	4	4	9B	50	ESC "WRITE"	
	5	5	31	50	1	
4	6	6	32	50	2 KBD LOCAL	
	7	7	9D	50	GS	
	8	8	2F	50	/ (Prot, Modified)	
	9	9	20	50	SP	
	A	10	C1	50	A	
	B	11	49	50	I	
	C	12	C4	50	D	
	D	13	9D	50	GS	
	E	14	DA	50	Z	
	F	15	00	52	Send RM	
D 9 5 1	0	16	20	50	SP	
	1	17	13	50	Insert Cursor	
	2	18	9D	50	GS	
	3	19	41	50	A (Mod)	
	4	20	38	40	Jump — MSG ETX	→
(5) (5)	5	21	57	41	Preset Return — (ECHO ENTER)	←
	6	22	89	40	Go To — Start TX	→
(5) (7)	7	23	02	50	STX	←
	8	24	08	58	Start BCC	
	9	25	9B	50	ESC "ERASE/WRITE"	
	A	26	B5	50	5	
	B	27	31	50	1 KVBD Locked Out & Printer ON	
	C	28	83	53	Send RM Until Trap Character = ETX	
	D	29	11	47	SET ACK FLAG = 1	
	E	30	39	40	Jump — BCC MSG	
(5)	F	31	61	41	Preset Return — END OF TEST	←

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

- CODE
- SPEED
- ASYNC / SYNC
- SYN CHARACTER
- STOP BIT 1.0 , 1.5 , 2.0
- BIT 5 , 6 , 7 , 8
- PARITY NONE , ODD , EVEN
- CONTROL EIA / OFF
- ON-LINE TD/RD , TD , RD
- OFF-LINE TERM / MODEM
- MON SIGS / NORMAL
- PATCH LIMITS
- CONTROL EIA (V.24)
- COUNTER ZONE
- INTERRUPTS
- FLAGS
- LATCH

CONTINUE ON OTHER SIDE

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CONTINUE ON OTHER SIDE

ADDRESS PAGE (CIRCLE ONE) 3 2 (1) 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →	ADDITIONAL INFORMATION (WRITE IN)
E A (6) 2	0	32	90	40	Go To Start TX	→	3270/75 D02A
(6) 1	1	33	02	50	STX ←		
	2	34	08	58	Start BCC		
	3	35	9B	50	ESC "WRITE"		
	4	36	31	50	1		
	5	37	27	50	1 KBD Locked Out; Start Printer, Bell		
	6	38	9D	50	GS		
6	7	39	D9	50	Y (Prot, Hi, UNMOD)		
	8	40	91	50	DC1 SET BUFFER ADRS		
	9	41	CE	50	Row 18		
	A	42	26	50	Col 0		
	B	43	01	62	127 CHAR MSG		
	C	44	9D	50	GS		
	D	45	AD	50	__ (Prot, UNMOD)		
	E	46	94	50	DC4 "REPEAT TO ADRS"		
	F	47	29	50	Row 24		
F B (7) 3	0	48	34	50	Col 69		
	1	49	AE	50	Character Dot		
	2	50	20	50	SP		
	3	51	45	50	E		
	4	52	CE	50	N		
	5	53	C4	50	D		
	6	54	20	50	SP		
7	7	55	4F	50	O		
	8	56	46	50	F		
	9	57	20	50	SP		
	A	58	54	50	T		
	B	59	45	50	E		
	C	60	D3	50	S		
	D	61	54	50	T		
	E	62	38	40	Jump MSG ETX	→	
(7) F		63	82	41	Preset (END)		

ADDITIONAL REMARKS

PROGRAM LOCATION
DTM S/N
CELL
RAM
PROM

PROGRAM WRITTEN BY: DATE

COMPANY NAME: ATLANTIC RESEARCH CORPORATION TEL. NO.

ADDRESS:

FORM NO. TP-139-3-77

INTERSHAKE II PROGRAM

TITLE: 3270-3275 | FILE NO. 002A | SHEET 3 OF 4

DESCRIPTION:

OBJECTIVE:

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C 8 4 0	0	0	FF	46	RT&J = FF	
	1	1	7F	40	Jump END	→
8 2	2	2	84	41	Preset Return	
	3	3	8F	40	Go To START TX	*
8 4	4	4	04	50	EOT	
	5	5	01	70	Alarm ON	
	6	6	40	81	Delay	
8	7	7	01	71	Alarm OFF	
	8	8	00	99	STOP / Jump To GEN POLL	
8 9	9	9	02	97	Disable Char. Interrupt (START TX)	← *
	A	10	10	95	Auto-Sync (Force out of Sync)	*
	B	11	(15)	(80)	Delay	*
	C	12	01	71	Beep OFF	*
	D	13	(02)	(82)	AUTO MODE = 200ms Poll Rate	*
8 E		14	(02)	(98)	No-Op	*
	F	15	00	94	Clear OFF	
D 9 5 1	0	16	10	73	DET RLSD OFF	
	1	17	80	70	Raise RTS	
	2	18	02	98	Start Timer	
	3	19	40	72	Det CTS ON	
	4	20	02	87	Stop Timer	
	5	21	00	49	Set RM Page 0	
	6	22	61	94	CRT Low ON	
9	7	23	16	50	SV	
	8	24	16	50	SV	
	9	25	16	50	SV	
	A	26	02	47	Jump F0 = 0	
	B	27	04	50	EOT	
	C	28	FF	50	FF	
	D	29	16	50	SV	
	E	30	16	50	SV	
	F	31	16	50	SV	

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

- CODE:
- SPEED
- * ASYNC / SYNC
- SYN CHARACTER
- STOP BIT 1.0 , 1.5 , 2.0
- [illegible] 5 , 6 , 7 , 8
- PARITY NONE , ODD , EVEN
- * CONTROL EIA / OFF
- * ON-LINE TD/RD , TD , RD
- * OFF-LINE TERM / MODEM
- * MON SIGS / NORMAL
- * PATCH CORDS
- CONTROL EIA (V. 24)
- COUNTER ZONE
- INTERRUPTS
- FLAGS
- LATCH

CONTINUE ON OTHER SIDE

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CONTINUE ON OTHER SIDE

*Starred entries are those that have been changed in this firmware revision.

ADDRESS PAGE (CIRCLE ONE) 3 (2) 1 0	STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS		JUMP ← →
E (A) 6 2 0	32	00	47	Set F0 = 0		
	33	02	47	J F0 = 0	RETURN	→
(A) 2	34	00	49	Set RM Page = 0	(REC)	←
3	35	12	83	Wait N Bits		
4	36	30	84	Set 3 Second For Int Timer		
5	37	0C	97	Enables Int Timer		
6	38	80	71	Drop RTS		
A 7	39	60	94	CRT LOW OFF		
8	40	16	17	Wait til ≠ Sync		
9	41	85	19	Enter Interrupt Char.		
A	42	03	97	Enable Char. Interrupt		
B	43	08	97	Int Disable		
C	44	BA	41	Preset		
D	45	01	46	RT&J = SOH	S&S	→
E	46	E7	41	Preset		
F	47	02	46	RT&J = STX	AID	→
F B 7 3 0	48	D3	41	PRE		
1	49	10	46	RT&J = DLE	ACK	→
2	50	2E	41	PRE		
3	51	15	46	RT&J = NAK	MSG	→
4	52	B7	41	PRE		
5	53	04	46	RT&J = EOT		
6	54	7F	40	Jump	END	→
(B) 7	55	12	41	PRE		
B 8	56	22	47	J S&S F = 0	SPEC POLL	→
9	57	09	40	Jump	GEN POLL	→
(B) A	58	08	38	Start BCC	(S&S)	←
B	59	7F	41	PRE		
C	60	25	45	J ≠ %	END	→
D	61	51	94	CRT Rev ON		
E	62	C3	41	PRE		
F	63	2F	44	J = / (R/TST)	SET TST	→

ADDITIONAL INFORMATION (WRITE IN)

3270/75
D02A

ADDITIONAL REMARKS

PROGRAM LOCATION
DTM S/N
CELL
RAM
PROM

PROGRAM WRITTEN BY: DATE

COMPANY NAME: ATLANTIC RESEARCH CORPORATION TEL. NO

ADDRESS:

FORM NO. TP-139-3-77

INTERSHAKE II PROGRAM

TITLE: 3270-3275

FILE NO. 002 A
SHEET 4 OF 4

DESCRIPTION:

OBJECTIVE:

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
C 8 4 0	0	0	CC	41	PRE	
	1	1	52	46	RT&J = R	
	2	2	7F	40	Jump	END →
C 3	3	3	31	47	Set RQTST F = 1	SET TST ←
C 4	4	4	00	36	Record Current Character	X S&S ←
	5	5	50	94	CRT REV OFF	
	6	6	83	25	Record Until ETX	
	7	7	7F	41	PRE	
C	8	8	00	39	J = BCCE	END →
	9	9	28	41	PRE	
	A	10	23	47	J S&S F = 1	RVI →
	B	11	CF	40	Jump	
C C	C	12	21	47	Set S&S F = 1	
	D	13	05	14	Wait 5 Characters	
	E	14	C4	40	Jump	
C E	F	15	3F	41	PRE	
D 9 5 1	0	16	42	47	J Enter = 0	AID ECHO →
	1	17	52	47	J MSG = 0	AID ECHO →
	2	18	55	40	Jump	ECHO ENTER →
D 3	3	19	D8	41	PRE	(ACK) ←
	4	20	B0	44	J = 70 ACK 0	
	5	21	DE	41	PRE	
	6	22	31	46	RT&J = 61 ACK 1	
D	7	23	7F	40	Jump	END →
D 8	8	24	7F	41	PRE	
	9	25	13	47	J ACK F = 1	END →
	A	26	11	47	S ACK F = 1	
	B	27	00	41	PRE	
	C	28	53	47	J MSG F = 1	GEN POLL →
	D	29	2E	40	Jump	MSG →
D E	E	30	7F	41	PRE	
	F	31	12	47	J ACK F = 0	END →

APPLICABLE INFORMATION (WRITE IN OR CIRCLE)

- CODE
- SPEED
- ASYNC / SYNC
- SYN CHARACTER
- STOP BIT 1.0 , 1.5 , 2.0
- INFO BITS 5 , 6 , 7 , 8
- PARITY NONE , ODD , EVEN
- CONTROL EIA / OFF
- ON-LINE TD/RD , TD , RD
- OFF-LINE TERM / MODEM
- MON SIGS / NORMAL
- PATCH CORDS
- CONTROL EIA (V. 24)
- COUNTER ZONE
- INTERRUPTS
- FLAGS
- LATCH

CONTINUE ON OTHER SIDE

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CONTINUE ON OTHER SIDE

ADDRESS PAGE (CIRCLE ONE) 3 2 1 0		ENTRY STEP	DATA	FUNCTION	FUNCTION DESCRIPTION/COMMENTS	JUMP ← →
E A 6 2	0	32	10	47	S ACK F = 0	
	1	33	20	41	PRE	
	2	34	33	47	J RQTST F = 1 SELECT	→
	3	35	12	41	PRE	
	4	36	52	47	J MSG = 0 SPEC POLL	→
	5	37	42	47	J Enter = 0 SPEC POLL	→
	6	38	5F	40	JUMP END OF TEST	→
E	7	39	08	38	Start BCC (AID)	←
	8	40	02	14	Wait 2 Characters	
	9	41	51	94	Rev ON CRT	
	A	42	ED	41	PRE	
	B	43	A7	44	J = Enter	
	C	44	C4	40	Jump X S&S	→
	D	45	41	47	Set Enter F = 1	←
	E	46	C4	40	Jump X S&S	→
	F	47				
F B 7 3	0	48				
	1	49				
	2	50				
	3	51				
	4	52				
	5	53				
	6	54				
	7	55				
	8	56				
	9	57				
	A	58				
	B	59				
	C	60				
	D	61	FF	40	Time OUT INT (3 Sec) GEN POLL	→
	E	62	09	40	Character INT (ENQ) GEN POLL	→
	F	63	08	97	Disable Interrupt	

ADDITIONAL INFORMATION (WRITE IN)

3270/75
D02A

ADDITIONAL REMARKS

PROGRAM LOCATION
DTM S/N
CELL
RAM
PROM

PROGRAM WRITTEN BY: DATE

COMPANY NAME: ATLANTIC RESEARCH CORPORATION TEL. NO.

ADDRESS:

FORM NO. TP-139-3-77

Inter-KEY Program Listing

(For an explanation of this listing format, see Part II, Section 4.3.)

```
Gg
5047 FLG  4241 PRE  FF46 RTJ  CC41 PRE
8519 INT  8940 JMP  7F40 JMP  5246 RTJ
0397 INT  0250 XMT  8441 PRE  7F40 JMP
0298 nop  0858 BCC  8F40 JMP  3147 FLG
1690 SYN  9B50 XMT  0450 XMT  0036 REC
1095 SYN  3150 XMT  C170 232  5094 AUX
0007 BSW  3250 XMT  4081 DLY  8325 REC
0641 PRE  9D50 XMT  0171 232  7F41 PRE

8247 JFG  2F50 XMT  0099 END  0039 JBE
0C41 PRE  2050 XMT  0297 INT  2841 PRE
0147 FLG  C150 XMT  1095 SYN  2347 JFG
8940 JMP  4950 XMT  1580 DLY  CF40 JMP
0298 nop  C450 XMT  0171 232  2147 FLG
2050 XMT  9D50 XMT  0282 DLY  0514 REC
2050 XMT  DA50 XMT  0298 nop  C440 JMP
A250 XMT  0052 XMT  0094 AUX  3F41 PRE

A250 XMT  2050 XMT  1073 232  4247 JFG
1A40 JMP  1350 XMT  8070 232  5247 JFG
1541 PRE  9D50 XMT  0298 nop  5540 JMP
0147 FLG  4150 XMT  4072 232  D841 PRE
8940 JMP  3840 JMP  0287 CTR  B044 JEC
0298 nop  5741 PRE  0049 -RM  DE41 PRE
2050 XMT  8940 JMP  6194 AUX  3146 RTJ
2050 XMT  0250 XMT  1650 XMT  7F40 JMP

2050 XMT  0858 BCC  1650 XMT  7F41 PRE
2050 XMT  9B50 XMT  1650 XMT  1347 JFG
8550 XMT  B550 XMT  0247 JFG  1147 FLG
1047 FLG  3150 XMT  0450 XMT  0041 PRE
2047 FLG  8353 XMT  FF50 XMT  5347 JFG
3047 FLG  1147 FLG  1650 XMT  2E40 JMP
4047 FLG  3940 JMP  1650 XMT  7F41 PRE
A240 JMP  6141 PRE  1650 XMT  1247 JFG

5047 FLG  9040 JMP  0047 FLG  1047 FLG
2441 PRE  0250 XMT  0247 JFG  2041 PRE
0147 FLG  0858 BCC  0049 -RM  3347 JFG
8940 JMP  9B50 XMT  1283 DLY  1241 PRE
0298 nop  3150 XMT  3084 INT  5247 JFG
2D50 XMT  2750 XMT  0C97 INT  4247 JFG
2D50 XMT  9D50 XMT  8071 232  5F40 JMP
1840 JMP  D950 XMT  6094 AUX  0838 BCC

1082 DLY  9150 XMT  1617 TRP  0214 REC
2B41 PRE  CE50 XMT  8519 INT  5194 AUX
8940 JMP  2650 XMT  0397 INT  ED41 PRE
1050 XMT  0162 MSG  0897 INT  A744 JEC
BC50 XMT  9D50 XMT  BA41 PRE  C440 JMP
A240 JMP  AD50 XMT  0146 RTJ  4147 FLG
3041 PRE  9450 XMT  E741 PRE  C440 JMP
8940 JMP  2950 XMT  0246 RTJ  0000 HLT

0250 XMT  3450 XMT  D341 PRE  0000 HLT
3B41 PRE  AE50 XMT  1046 RTJ  0000 HLT
6347 JFG  2050 XMT  2E41 PRE  0000 HLT
6147 FLG  4550 XMT  1546 RTJ  0000 HLT
1858 BCC  CE50 XMT  B741 PRE  0000 HLT
0166 MSG  C450 XMT  0446 RTJ  0000 HLT
0167 MSG  2050 XMT  7F40 JMP  0000 HLT
0161 MSG  4F50 XMT  1241 PRE  0000 HLT

8350 XMT  4650 XMT  2247 JFG  0000 HLT
0059 BCC  2050 XMT  0940 JMP  0000 HLT
A240 JMP  5450 XMT  0838 BCC  0000 HLT
6047 FLG  4550 XMT  7F41 PRE  0000 HLT
5147 FLG  D350 XMT  2545 JNC  0000 HLT
0858 BCC  5450 XMT  5194 AUX  FF40 JMP
3540 JMP  3840 JMP  C341 PRE  0940 JMP
1147 FLG  8241 PRE  2F44 JEC  0897 INT
SA
```

APPENDIX C

FILE D03:

COMBINED EBCDIC AND ASCII

3270 FIRMWARE STORED TEST

Inter-KEY Program Listing (EBCDIC)
(For an explanation of this listing format, see Part II, Section 4.3.)

```
Gq
5047 FLG  4241 PRE  FF46 RTJ  CC41 PRE
2D19 INT  8940 JMP  7F40 JMP  D946 RTJ
0397 INT  0250 XMT  8441 PRE  7F40 JMP
FF57 xmt  0058 BCC  8F40 JMP  3147 FLG
3290 SYN  2750 XMT  3750 XMT  0036 REC
1095 SYN  F150 XMT  0170 232  5094 AUX
0007 BSW  F250 XMT  4081 DLY  0325 REC
0641 PRE  1D50 XMT  0171 232  7F41 PRE

8247 JFG  6150 XMT  0099 END  0039 JBE
0C41 PRE  4050 XMT  0297 INT  2841 PRE
0147 FLG  C150 XMT  1095 SYN  2347 JFG
8940 JMP  C950 XMT  1580 DLY  CF40 JMP
0298 nop  C450 XMT  0171 232  2147 FLG
4050 XMT  1D50 XMT  0282 DLY  0514 REC
4050 XMT  E950 XMT  0298 nop  C440 JMP
7F50 XMT  0052 XMT  0094 AUX  3F41 PRE

7F50 XMT  4050 XMT  1073 232  4247 JFG
1A40 JMP  1350 XMT  8070 232  5247 JFG
1541 PRE  1D50 XMT  0298 nop  5540 JMP
0147 FLG  C150 XMT  4072 232  D841 PRE
8940 JMP  3840 JMP  0287 CTR  7044 JEC
0298 nop  5741 PRE  0049 -RM  DE41 PRE
4050 XMT  8940 JMP  6194 AUX  6146 RTJ
4050 XMT  0250 XMT  3250 XMT  7F40 JMP

4050 XMT  0058 BCC  3250 XMT  7F41 PRE
4050 XMT  2750 XMT  3250 XMT  1347 JFG
2D50 XMT  F550 XMT  0247 JFG  1147 FLG
1047 FLG  F150 XMT  3750 XMT  0041 PRE
2047 FLG  0353 XMT  FF50 XMT  5347 JFG
3047 FLG  1147 FLG  3250 XMT  2E40 JMP
4047 FLG  3940 JMP  3250 XMT  7F41 PRE
A240 JMP  6141 PRE  3250 XMT  1247 JFG

5047 FLG  9040 JMP  0047 FLG  1047 FLG
2441 PRE  0250 XMT  0247 JFG  2041 PRE
0147 FLG  0058 BCC  0049 -RM  3347 JFG
8940 JMP  2750 XMT  1283 DLY  1241 PRE
0298 nop  F150 XMT  0187 CTR  5247 JFG
6050 XMT  7D50 XMT  3084 INT  4247 JFG
6050 XMT  1D50 XMT  0C97 INT  5F40 JMP
1840 JMP  E850 XMT  8071 232  0038 BCC

1082 DLY  1150 XMT  6094 AUX  0214 REC
2B41 PRE  D550 XMT  3217 TRP  5194 AUX
8940 JMP  5050 XMT  0287 CTR  ED41 PRE
1050 XMT  0164 MSG  0897 INT  7D44 JEC
7C50 XMT  1D50 XMT  BA41 PRE  C440 JMP
A240 JMP  6050 XMT  0146 RTJ  4147 FLG
3041 PRE  3C50 XMT  E741 PRE  C440 JMP
8940 JMP  5D50 XMT  0246 RTJ  0000 HLT

0250 XMT  F450 XMT  D341 PRE  0000 HLT
3B41 PRE  4B50 XMT  1046 RTJ  0000 HLT
6347 JFG  4050 XMT  2E41 PRE  0000 HLT
6147 FLG  C550 XMT  3D46 RTJ  0000 HLT
1058 BCC  D550 XMT  B741 PRE  0000 HLT
0166 MSG  C450 XMT  3746 RTJ  0000 HLT
0167 MSG  4050 XMT  7F40 JMP  0000 HLT
0163 MSG  D650 XMT  1241 PRE  0000 HLT

0350 XMT  C650 XMT  2247 JFG  0000 HLT
0059 BCC  4050 XMT  0940 JMP  0000 HLT
A240 JMP  E350 XMT  0038 BCC  0000 HLT
6047 FLG  C550 XMT  7F41 PRE  0000 HLT
5147 FLG  E250 XMT  6C45 JMC  0000 HLT
0058 BCC  E350 XMT  5194 AUX  FF40 JMP
3540 JMP  3840 JMP  C341 PRE  0940 JMP
1147 FLG  8241 PRE  6144 JEC  0897 INT
s>
```

Inter-KEY Program Listing (ASCII)

(For an explanation of this listing format, see Part II, Section 4.3.)

```
Eg
5047 FLG  4241 PRE  FF46 RTJ  CC41 PRE
8519 INT  8940 JMP  7F40 JMP  5246 RTJ
0397 INT  0250 XMT  8441 PRE  7F40 JMP
0298 nop  0858 BCC  8F40 JMP  3147 FLG
1690 SYN  9B50 XMT  0450 XMT  0036 REC
1095 SYN  3150 XMT  C170 232  5094 AUX
0007 BSW  3250 XMT  4081 DLY  8325 REC
0641 PRE  9D50 XMT  0171 232  7F41 PRE

8247 JFG  2F50 XMT  0099 END  0039 JBE
0C41 PRE  2050 XMT  0297 INT  2841 PRE
0147 FLG  C150 XMT  1095 SYN  2347 JFG
8940 JMP  4950 XMT  1580 DLY  CF40 JMP
0298 nop  C450 XMT  0171 232  2147 FLG
2050 XMT  9D50 XMT  0282 DLY  0514 REC
2050 XMT  DA50 XMT  0298 nop  C440 JMP
A250 XMT  0052 XMT  0094 AUX  3F41 PRE

A250 XMT  2050 XMT  1073 232  4247 JFG
1A40 JMP  1350 XMT  8070 232  5247 JFG
1541 PRE  9D50 XMT  0298 nop  5540 JMP
0147 FLG  4150 XMT  4072 232  D841 PRE
8940 JMP  3840 JMP  0287 CTR  B044 JEC
0298 nop  5741 PRE  0049 -RH  DE41 PRE
2050 XMT  8940 JMP  6194 AUX  3146 RTJ
2050 XMT  0250 XMT  1650 XMT  7F40 JMP

2050 XMT  0858 BCC  1650 XMT  7F41 PRE
2050 XMT  9B50 XMT  1650 XMT  1347 JFG
8550 XMT  B550 XMT  0247 JFG  1147 FLG
1047 FLG  3150 XMT  0450 XMT  0041 PRE
2047 FLG  8353 XMT  FF50 XMT  5347 JFG
3047 FLG  1147 FLG  1650 XMT  2E40 JMP
4047 FLG  3940 JMP  1650 XMT  7F41 PRE
A240 JMP  6141 PRE  1650 XMT  1247 JFG

5047 FLG  9040 JMP  0047 FLG  1047 FLG
2441 PRE  0250 XMT  0247 JFG  2041 PRE
0147 FLG  0858 BCC  0049 -RH  3347 JFG
8940 JMP  9B50 XMT  1283 DLY  1241 PRE
0298 nop  3150 XMT  3084 INT  5247 JFG
2D50 XMT  2750 XMT  0C97 INT  4247 JFG
2D50 XMT  9D50 XMT  8071 232  5F40 JMP
1840 JMP  D950 XMT  6094 AUX  0838 BCC

1082 DLY  9150 XMT  1617 TRP  0214 REC
2B41 PRE  CE50 XMT  8519 INT  5194 AUX
8940 JMP  2650 XMT  0397 INT  ED41 PRE
1050 XMT  0162 MSG  0897 INT  A744 JEC
BC50 XMT  9D50 XMT  BA41 PRE  C440 JMP
A240 JMP  AD50 XMT  0146 RTJ  4147 FLG
3041 PRE  9450 XMT  E741 PRE  C440 JMP
8940 JMP  2950 XMT  0246 RTJ  0000 HLT

0250 XMT  3450 XMT  D341 PRE  0000 HLT
3B41 PRE  AE50 XMT  1046 RTJ  0000 HLT
6347 JFG  2050 XMT  2E41 PRE  0000 HLT
6147 FLG  4550 XMT  1546 RTJ  0000 HLT
1858 BCC  CE50 XMT  B741 PRE  0000 HLT
0160 MSG  C450 XMT  0446 RTJ  0000 HLT
0165 MSG  2050 XMT  7F40 JMP  0000 HLT
0161 MSG  4F50 XMT  1241 PRE  0000 HLT

8350 XMT  4650 XMT  2247 JFG  0000 HLT
0059 BCC  2050 XMT  0940 JMP  0000 HLT
A240 JMP  5450 XMT  0838 BCC  0000 HLT
6047 FLG  4550 XMT  7F41 PRE  0000 HLT
5147 FLG  D350 XMT  2545 JNC  0000 HLT
0858 BCC  5450 XMT  5194 AUX  FF40 JMP
3540 JMP  3840 JMP  C341 PRE  0940 JMP
1147 FLG  8241 PRE  2F44 JEC  0897 INT
si
```

Message Content of EBCDIC-ASCII Message PROMs
(842G-004 and Functions 60, 65, 66, 67 of 842G-006)

Both characters and hexadecimal equivalents are shown.

When codes do not use eight bits, the unused bits may be "stuffed" with either 1 or 0. The hexadecimal equivalents shown in the following messages include such stuffed bits.

Each message of 80 or 122 characters' length is designed to be readable and contains the same word structure in all codes.

Parentheses ( ) signify the character will not (normally) be displayed or printed as a symbol. Some EBCDIC CRT displays present NL, CR, LF as symbols (characters or punctuation). Refer to the specific terminal's code set when these are encountered.

FUNCTION 60: ASCII 3270-TEST MESSAGE FORM, PART 1

–	5	I	–	(SP)	–	–	Z	3	2	7	0	(SP)	7	5	(SP)
9B	35	21	91	20	AD	9D	5A	B3	32	37	B0	20	37	B5	20
–	'	T	E	S	T	–	–	–	B	–	DC4 (PF)	C	0	*	DC4 (PF)
9D	2C	54	45	D3	54	9D	2D	91	C2	AD	94	43	B0	2A	94
D	K	.	P	R	O	T	E	C	T	E	D	DC4 (PF)	E	(SP)	.
C4	4B	AE	D0	52	4F	54	45	43	54	45	C4	94	45	20	AE
–	E	/	–	D	I	S	P	L	A	Y	E	D	–	–	F
91	45	2F	3E	C4	49	D3	D0	4C	C1	D9	45	C4	BC	91	46
1	–	–	%	N	O	N	–	D	I	S	–	–	D	N	O
31	3E	9D	25	CE	4F	CE	AD	C4	49	D3	9D	AD	C4	CE	4F
N	–	D	I	S	P	L	A	Y	E	D	–	H	0	–	/
CE	AD	C4	49	D3	D0	4C	C1	D9	45	C4	91	C8	B0	9D	2F
DC4 (PF)	I	J	.	N	O	N	–	P	R	O	T	E	C	T	E
94	49	4A	AE	CE	4F	CE	AD	D0	52	4F	54	45	43	54	45
D	DC4 (PF)	–	(SP)	.	–	–	Λ(UC)	–	/	–	–	A	DC3 (RS)		
C4	94	5B	20	AE	91	5B	5E	9D	2F	3E	9D	C1	13		

FUNCTION 61: 80-CHARACTER ASCII MESSAGE

I	N	T	E	R	S	H	A	K	E	(SP)	A	n	a	l	y
49	CE	54	45	52	D3	C8	C1	CB	45	A0	C1	6E	61	EC	79
z	e	s	(SP)	A	n	d	(SP)	F	i	n	d	s	(SP)	Y	o
7A	E5	73	A0	C1	6E	64	A0	46	E9	6E	64	73	A0	D9	EF
u	r	(SP)	D	a	t	a	(SP)	C	o	m	m	u	n	i	c
75	F2	A0	C4	61	F4	61	A0	43	EF	6D	6D	75	6E	E9	E3
a	t	i	o	n	s	(SP)	P	r	o	b	l	e	m	s	(SP)
61	F4	E9	EF	6E	73	A0	D0	F2	EF	62	EC	E5	6D	73	A0
F	a	s	t	!	(SP)	1	2	3	4	5	6	7	8	9	0
46	61	73	F4	A1	A0	31	32	B3	34	B5	B6	37	38	B9	B0

FUNCTION 62: 122-CHARACTER ASCII MESSAGE

I	N	T	E	R	S	H	A	K	E	(SP)	a	n	d	(SP)	l
49	CE	54	45	52	D3	C8	C1	CB	45	A0	C1	6E	64	A0	49
N	T	E	R	V	I	E	W	(SP)	J	o	i	n	(SP)	T	o
CE	54	45	52	D6	49	45	57	A0	4A	EF	E9	6E	A0	54	EF
g	e	t	h	e	r	(SP)	T	o	(SP)	Q	u	i	c	k	l
67	E5	F4	68	E5	F2	A0	54	EF	A0	51	75	E9	E3	6B	EC
y	(SP)	S	i	m	u	l	a	t	e	(SP)	a	n	d	(SP)	A
79	A0	D3	E9	6D	75	EC	61	F4	E5	A0	61	6E	64	A0	C1
n	a	l	y	z	e	(SP)	Y	o	u	r	(SP)	D	a	t	a
6E	61	EC	79	7A	E5	A0	D9	EF	75	F2	A0	C4	61	F4	61
(SP)	C	o	m	m	u	n	i	c	a	t	i	o	n	s	(SP)
A0	43	EF	6D	6D	75	6E	E9	E3	61	F4	49	EF	6E	73	A0
P	r	o	b	l	e	m	s	!	(SP)	1	2	3	4	5	6
D0	F2	EF	62	EC	E5	6D	73	A1	A0	31	32	B3	34	B5	B6
7	8	9	0	(SP)	#	&	@	/	–						
37	38	B9	B0	A0	23	26	40	2F	2D						

FUNCTION 63: 80-CHARACTER EBCDIC MESSAGE

I	N	T	E	R	S	H	A	K	E	(SP)	A	n	a	l	y
C9	D5	E3	C5	D9	E2	C8	C1	D2	C5	40	C1	95	81	93	A8
z	e	s	(SP)	A	n	d	(SP)	F	i	n	d	s	(SP)	Y	o
A9	85	A2	40	C1	95	84	40	C6	89	95	84	A2	40	E8	96
u	r	(SP)	D	a	t	a	(SP)	C	o	m	m	u	n	ı	c
A4	99	40	C4	81	A3	81	40	C3	96	94	94	A4	95	89	83
a	t	i	o	n	s	(SP)	P	r	o	b	l	e	m	s	(SP)
81	A3	89	96	95	A2	40	D7	99	96	82	93	85	94	A2	40
F	a	s	t	!	(SP)	1	2	3	4	5	6	7	8	9	0
C6	81	A2	A3	5A	40	F1	F2	F3	F4	F5	F6	F7	F8	F9	F0

FUNCTION 64: 122-CHARACTER EBCDIC MESSAGE

I	N	T	E	R	S	H	A	K	E	(SP)	a	n	d	(SP)	I
C9	D5	E3	C5	D9	E2	C8	C1	D2	C5	40	81	95	84	40	C9
N	T	E	R	V	I	E	W	(SP)	J	o	i	n	(SP)	T	o
D5	E3	C5	D9	E5	C9	C5	E6	40	D1	96	89	95	40	E3	96
g	e	t	h	e	r	(SP)	T	o	(SP)	Q	u	i	c	k	l
87	85	A3	88	85	99	40	E3	96	40	D8	A4	89	83	92	93
y	(SP)	S	i	m	u	l	a	t	e	(SP)	A	n	d	(SP)	A
A8	40	E2	89	94	A4	93	81	A3	85	40	C1	95	84	40	C1
n	a	l	y	z	e	(SP)	Y	o	u	r	(SP)	D	a	t	a
95	81	93	A8	A9	85	40	E8	96	A4	99	40	C4	81	A3	81
(SP)	C	o	m	m	u	n	i	c	a	t	i	o	n	s	(SP)
40	C3	96	94	94	A4	95	89	83	81	A3	89	96	95	A2	40
P	r	o	b	l	e	m	s	!	(SP)	1	2	3	4	5	6
D7	99	96	82	93	85	94	A2	5A	40	F1	F2	F3	F4	F5	F6
7	8	9	0	(SP)	#	&	@	/	–						
F7	F8	F9	F0	40	7B	50	7C	61	60						

FUNCTION 65: ASCII 3270-TEST MESSAGE FORM, PART 2

DC4 (PF)	–	%	.	–	/	–	–	–	A	L	P	H	A	–	.
94	5B	25	AE	9E	2F	BC	9D	AD	C1	4C	D0	C8	C1	91	AE
?	–	/	–	–	J	DC4 (PF)	.	@	.	–	1	–	–	–	N
BF	9D	2F	3E	9D	4A	94	AE	40	AE	9D	31	BC	9D	AD	CE
U	M	E	R	I	C	–	–	"	–	/	–	–	(	–	(
D5	CD	45	52	49	43	91	BC	A2	9D	2F	3E	9D	A8	91	A8
–	–	/	–	–	–	A	L	P	H	A	(SP)	N	O	N	–
BC	9D	2F	BC	9D	AD	C1	4C	D0	C8	C1	20	CE	4F	CE	AD
D	I	S	P	L	A	Y	E	D	–	J	Λ(UC)	–	Y		
C4	49	D3	D0	4C	C1	D9	45	C4	91	4A	5E	9D	D9		

FUNCTION 66: EBCDIC 3270-TEST MESSAGE FORM, PART 1

(ESC)	5	!	(DC1)	(SP)	–	(GS)	Z	3	2	7	0	(SP)	7	5	(SP)
27	F5	5A	11	40	60	1D	E9	F3	F2	F7	F0	40	F7	F5	40
GS	V	T	E	S	T	(GS)	–	(DC1)	B	–	(DC4)	C	0	*	(DC4)
1D	E5	E3	C5	E2	E3	1D	60	11	C2	60	3C	C3	F0	5C	3C
D	K	.	P	R	O	T	E	C	T	E	D	(DC4)	E	(SP)	.
C4	D2	4B	D7	D9	D6	E3	C5	C3	E3	C5	C4	3C	C5	40	4B
(DC1)	E	/	>	D	I	S	P	L	A	Y	E	D	<	(DC1)	F
11	C5	61	6E	C4	C9	E2	D7	D3	C1	E8	C5	C4	4C	11	C6
1	>	'	–	N	O	N	–	D	I	S	(GS)	–	<	N	O
F1	6E	1D	6D	D5	D6	D5	60	C4	C9	E2	1D	60	4C	D5	D6
N	–	D	I	S	P	L	A	Y	E	D	(DC1)	H	0	(GS)	/
D5	60	C4	C9	E2	D7	D3	C1	E8	C5	C4	11	C8	F0	1D	61
(DC4)	I	J	.	N	O	N	–	P	R	O	T	E	C	T	E
3C	C9	D1	4B	D5	D6	D5	60	D7	D9	D6	E3	C5	C3	E3	C5
D	(DC4)	–	(SP)	.	(DC1)	–	–	(GS)	/	>	(GS)	A	(DC3)		
C4	3C	4A	40	4B	11	4A	5F	1D	61	6E	1D	C1	13		

FUNCTION 67: EBCDIC 3270-TEST MESSAGE FORM, PART 2

(DC4)	–	%	.	(GS)	/	<	(GS)	–	A	L	P	H	A	(DC1)	.
3C	4A	6C	4B	1D	61	4C	1D	60	C1	D3	D7	C8	C1	11	4B
?	(GS)	/	>	(GS)	J	(DC4)	.	@	.	(GS)	1	<	(GS)	–	N
6F	1D	61	6E	1D	D1	3C	4B	7C	4B	1D	F1	4C	1D	60	D5
U	M	E	R	I	C	(DC1)	<	"	(GS)	/	>	(GS)	(	(DC1)	(
E4	D4	C5	D9	C9	C3	11	4C	7F	1D	61	6E	1D	4D	11	4D
<	(GS)	/	<	(GS)	–	A	L	P	H	A	(SP)	N	O	N	–
4C	1D	61	4C	1D	60	C1	D3	D7	C8	C1	40	D5	D6	D5	60
D	I	S	P	L	A	Y	E	D	(DC1)	J	–	(GS)	Y		
C4	C9	E2	D7	D3	C1	E8	C5	C4	11	D1	5F	1D	E8		

FUNCTION 60: ASCII 40/4-TEST MESSAGE FORM, PART 1

–	5	I	–	(SP)	–	–	Z	3	2	7	0	(SP)	7	5	(SP)
9B	35	21	91	20	AD	9D	5A	B3	32	37	B0	20	37	B5	20
–	'	T	E	S	T	–	–	–	B	–	DC4 (PF)	C	0	*	DC4 (PF)
9D	2C	54	45	D3	54	9D	2D	91	C2	AD	94	43	B0	2A	94
D	K	.	P	R	O	T	E	C	T	E	D	DC4 (PF)	E	(SP)	.
C4	4B	AE	D0	52	4F	54	45	43	54	45	C4	94	45	20	AE
–	E	/	–	D	I	S	P	L	A	Y	E	D	–	–	F
91	45	2F	3E	C4	49	D3	D0	4C	C1	D9	45	C4	BC	91	46
1	–	–	%	N	O	N	–	D	I	S	–	–	D	N	O
31	3E	9D	25	CE	4F	CE	AD	C4	49	D3	9D	AD	C4	CE	4F
N	–	D	I	S	P	L	A	Y	E	D	–	H	0	–	/
CE	AD	C4	49	D3	D0	4C	C1	D9	45	C4	91	C8	B0	9D	2F
DC4 (PF)	I	J	.	N	O	N	–	P	R	O	T	E	C	T	E
94	49	4A	AE	CE	4F	CE	AD	D0	52	4F	54	45	43	54	45
D	DC4 (PF)	–	(SP)	.	–	–	Λ(UC)	–	/	–	–	A	DC3 (RS)		
C4	94	5B	20	AE	91	5B	5E	9D	2F	3E	9D	C1	13		

FUNCTION 65: ASCII 40/4-TEST MESSAGE FORM, PART 2

I	S	–	(SP)	–	–	C	0	P	R	O	T	E	C	T	E
49	53	1D	20	3C	11	43	30	50	52	4F	54	45	43	54	45
D	(SP)	N	O	N	D	I	S	P	L	A	Y	E	D	(SP)	F
44	20	4E	4F	4E	44	49	53	50	4C	41	59	45	44	20	46
I	E	L	D	–	–	%	P	R	O	(SP)	N	O	N	D	I
49	45	4C	44	3E	1D	25	50	52	4F	20	4E	4F	4E	44	49
S	–	(SP)	–	–	E	(SP)	N	U	M	E	R	I	C	(SP)	F
53	1D	20	3C	11	45	20	4E	55	4D	45	52	49	43	20	46
I	E	L	D	–	–	&	.	.	.	–	(SP)	–	–	F	&
49	45	4C	44	3E	1D	26	2E	2E	2E	1D	20	3C	11	46	26
1	3	2	–	@	0	–	(SP)	C	H	A	R	A	C	T	E
31	33	32	1D	40	30	1D	20	43	48	41	52	41	43	54	45
R	R	0	W	(SP)	0	F	(SP)	X	–	S	(LF)	–	G	–	DC4 (PF)
52	52	4F	57	20	4F	46	20	58	27	53	0A	11	47	2D	14
I	U	X	–	C	–	(SP)	–	I	V	DC3 (RS)	–				
49	55	58	3E	43	3C	20	11	49	56	13	03				

FUNCTION 66: EBCDIC 40/4-TEST MESSAGE FORM, PART 1

(ESC)	5	"	T	E	S	T	(SP)	F	O	R	(SP)	A	(SP)	S	Y
27	F5	7F	E3	C5	E2	E3	40	C6	D6	D9	40	C1	40	E2	E8
N	C	H	R	O	N	O	U	S	(SP)	D	A	T	A	S	P
D5	C3	C8	D9	D6	D5	D6	E4	E2	40	C4	C1	E3	C1	E2	D7
E	E	D	(GS)	4	4	0	(GS)	D	(DC1)	A	&	E	R	R	(GS)
C5	C5	C4	1D	F4	F4	F0	1D	C4	11	C1	50	C5	D9	D9	1D
–	P	R	O	T	E	C	T	E	D	(GS)	H	(DC1)	A	&	(DC2)
60	D7	D9	D6	E3	C5	C3	E3	C5	C4	1D	C8	11	C1	50	12
A	P	(HT)	I	N	T	E	N	S	I	F	I	E	D	(GS)	(SP)
C1	D7	05	C9	D5	E3	C5	D5	E2	C9	C6	C9	C5	C4	1D	40
(DC1)	B	–	N	O	N	P	R	O	T	E	C	T	E	D	(GS)
11	C2	60	D5	D6	D5	D7	D9	D6	E3	C5	C3	E3	C5	C4	1D
A	N	O	N	D	I	S	P	L	A	Y	E	D	(GS)	(SP)	F
C1	D5	D6	D5	C4	C9	E2	D7	D3	C1	E8	C5	C4	1D	40	C6
I	E	L	D	>	(GS)	<	N	O	N	P	R	O	/	D	
C9	C5	D3	C4	6E	1D	4C	D5	D6	D5	D7	D9	D6	61	C4	

FUNCTION 67: EBCDIC 40/4-TEST MESSAGE FORM, PART 2

I	S	(GS)	(SP)	<	(DC1)	C	O	P	R	O	T	E	C	T	E
C9	E2	1D	40	4C	11	C3	F0	D7	D9	D6	E3	C5	C3	E3	C5
D	(SP)	N	O	N	D	I	S	P	L	A	Y	E	D	(SP)	F
C4	40	D5	D6	D5	C4	C9	E2	D7	D3	C1	E8	C5	C4	40	C6
I	E	L	D	>	(GS)	%	P	R	O	(SP)	N	O	N	D	I
C9	C5	D3	C4	6E	1D	6C	D7	D9	D6	40	D5	D6	D5	C4	C9
S	(GS)	(SP)	<	(DC1)	E	(SP)	N	U	M	E	R	I	C	(SP)	F
E2	1D	40	4C	11	C5	40	D5	E4	D4	C5	D9	C9	C3	40	C6
I	E	L	D	>	(GS)	&	.	.	.	(GS)	(SP)	<	(DC1)	F	&
C9	C5	D3	C4	6E	1D	40	4B	4B	4B	1D	40	4C	11	C6	50
1	3	2	(GS)	@	0	(GS)	(SP)	C	H	A	R	A	C	T	E
F1	F3	F2	1D	7C	F0	1D	40	C3	C8	C1	D9	C1	C3	E3	C5
R	R	O	W	(SP)	O	F	(SP)	X	'	S	(NL)	(DC1)	G	–	(DC4)
D9	D9	D6	E6	40	D6	C6	40	E7	7D	E2	15	11	C7	60	3C
I	U	X	>	C	<	(SP)	(DC1)	I	V	(DC3)	(ETX)				
C9	E4	E7	6E	C3	4C	40	11	C9	E5	13	03				

APPENDIX D

USER NOTES

NOTES

ATTENTION
ATLANTIC RESEARCH USERS

We want to insure that your name is on our

Users Group Mailing List

We want to keep you informed of all the latest advances in ARC products.

Please fill in your name(s), address(es), telephone number(s) and check the appropriate box for the equipment you presently own. Send the information to us as soon as possible.

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Test Equipment

- ☐ INTERSHAKE
- ☐ INTERVIEW
- ☐ INTERVIEW II
- ☐ INTERVIEW 3000
- ☐ INTERVIEW 3500
- ☐ DATA TECH 9600
- ☐ PMK04
- ☐ Other _____

Tech Control Products/Systems

- ☐ NCS-100
- ☐ RCS-100
- ☐ Digital Patching/Switching Please specify _____
- ☐ VF Patching/Switching Please specify _____
- ☐ Coax Patching/Switching Please specify _____
- ☐ TTY Patching/Switching Please specify _____

Name

Company

Address

ZIP

Telephone

Test Equipment

- ☐ INTERSHAKE
- ☐ INTERVIEW
- ☐ INTERVIEW II
- ☐ INTERVIEW 3000
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- ☐ NCS-100
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- ☐ VF Patching/Switching Please specify _____
- ☐ Coax Patching/Switching Please specify _____
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